

# U.S. NAVY MEDICINE

April 1982



**Corpsmen Who  
Teach the Aviators**

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# New Commodore Selectees

The Navy Medical Department has three new commodore selectees.

The commodore rank was reinstated by the Navy under the Defense Officer Personnel Management Act (DOPMA) in September 1981 to bring the Navy in line with the other services, all of which have a one-star rank.

Commodore-selectee **Lewis E. Angelo**, MSC, Commanding Officer of the Naval Medical Data Services Center, Bethesda, MD, since 1978, is the first Medical Service Corps officer in the history of the Navy Medical Department to be selected to flag rank.

Born 18 Feb 1928 in Forestville, PA, CAPT Angelo graduated from George Washington University in 1964 and received an M.A. in personnel administration from the same university in 1965.

CAPT Angelo enlisted in the Navy Hospital Corps in 1948 and was commissioned an ensign in the Medical Service Corps in 1958. Subsequent duty stations were naval hospitals St. Albans, NY, 1958-61, and Chelsea, MA, 1961-63; the Bureau of Medicine and Surgery, Washington, DC, 1964-67, 1970-78; and Office of the Secretary of the Navy, White House Liaison Office, 1967-70.

CAPT Angelo is a member of the American Management Association, the Society for Management Information Systems, and the Association of Military Surgeons of the United States, and is an affiliate of the American College of Hospital Ad-



*CAPT Angelo*

ministrators. He holds the Meritorious Service Medal (gold star in lieu of 2nd award), Navy Commendation Medal, and Good Conduct Medal.

Commodore-selectee **Joseph S. Cassels**, MC, Commanding Officer of NRMC Charleston, SC, since July 1980, was born 9 Nov 1934 in Chester, SC.

Dr. Cassells received his M.D. from Duke University School of Medicine, Durham, NC, in 1960. He completed his internship at NNMC Bethesda, MD, and served his residency in internal medicine at Naval Hospital, St. Albans, NY. He received his MPH from the Johns Hopkins University School of Public Health, Baltimore, MD, in 1968.

Dr. Cassells's duty assignments include the Johns Hopkins Center

for Medical Research and Training (Tropical Medicine), Calcutta, India, 1968-69; Head, Academic Department, Naval Medical School, and consultant in tropical medicine, NNMC Bethesda, MD, 1969-71; Chief, Experimental Parasitology Division, Naval Medical Research Institute, Bethesda, MD, 1971-74; Project Director, Navy Physician's Assistant Program, 1973-75; Head, Medical Corps Programs, Naval Health Sciences Education and Training Command, Bethesda, MD, 1974-75; Deputy, Special Assistant to the Surgeon General for Education and Training, Washington, DC, 1975-77; Special Assistant to the Surgeon General for Professional Matters, Washington, DC, 1977-78; and Director of Clinical Services, NRMC San Diego, CA, 1978-80.



*CAPT Cassels*

Dr. Cassells is a member of the Charleston County Medical Society, the American Medical Association, and the Rotary Club. His military awards include the Legion of Merit, Meritorious Unit Commendation, Navy Expeditionary Medal, and National Defense Service Medal.

Commodore-selectee **Richard G. Shaffer**, DC, Commanding Officer of NRDC Great Lakes, IL, since 1979, was born 27 July 1943 in Canton, OH.

Dr. Shaffer graduated from Ohio Wesleyan University in 1956, received his D.D.S. from the School of Dentistry, Case Western Reserve University in 1960, and obtained his M.A. in education from George Washington University in 1978.

Dr. Shaffer was commissioned a lieutenant in the Dental Corps in 1960 and served his internship at the Naval Hospital, Portsmouth, VA, from 1960-61. Subsequent duty assignments were Assistant Dental Officer, USS *Amphion* (AR-13), Nor-

folk, VA, 1961-63; Assistant Dental Officer, U.S. Naval Academy, Annapolis, MD, 1963-66; Assistant Dental Officer, Naval Station, Rodman, and Dental Officer, Galeta Island Security Group, Panama Canal Zone, 1966-69; resident in general dentistry, Naval Dental School, Bethesda, MD, 1969-70; Head, Operative Dentistry Department, Clinical Coordinator, Naval Dental Clinic, Norfolk, VA, 1970-73; Dental Officer, USS *Simon Lake* (AS-B3), Submarine Squadron Sixteen Dental Officer, Rota, Spain, 1973-75; Chairman, Department of Educational Resources and Curriculum Coordinator, NNDC Bethesda, MD, 1975-76; and Director of Education, NNDC Bethesda, MD, 1976-79.

Dr. Shaffer is a member of the American Dental Association, the Association of Military Surgeons, the Association of American Dental Schools, the International College of Dentists, the Academy of General Dentistry, the Chicago Dental Soci-



CAPT Shaffer

ety, and the Great Lakes Dental Society. He holds the Meritorious Service Medal, Navy Commendation Medal, Battle Efficiency Award, National Defense Service Medal, and Sea Service Ribbon. □

## CHAMPUS Beneficiaries Will Pay Less for Medical Services

Changes in the Defense Authorization Act that went into effect 1 April 1982 will result in lower out-of-pocket costs for CHAMPUS beneficiaries. The changes should also increase participation by physicians and other health-care providers in the military health program.

CHAMPUS is a cost-sharing program for the health care received in civilian facilities by military dependents, retirees and their dependents. After yearly deductibles are paid by beneficiaries, CHAMPUS will pay either 80 percent (for dependents of active duty members) or 75 percent (for retirees and their dependents) of an allowable charge. The "allowable charge" is the maximum that CHAMPUS will pay for a specific medical procedure or service.

"The legislation simplifies the procedure for determining allowable charges and permits an update every 6 months instead of annually. This means

CHAMPUS payments will more accurately approximate the current fees charged by physicians and other noninstitutional health-care providers," explained Theodore D. Wood, OCHAMPUS Director.

Under the new procedure, CHAMPUS profiles the fees for specific medical procedures charged the year before by health-care providers who billed CHAMPUS. Profiles of professional fees for both in- and out-patient services are established for each state. The allowable charge is then set at a level that would cover the fees charged by eight of ten health-care providers.

According to Mr. Wood, "The changes in CHAMPUS reimbursement will allow an extra \$8 million in benefits payments the first year. We'll be relieving beneficiaries of some of their medical costs and hopefully attracting more health-care providers into the CHAMPUS program."



# Hypothermia

CDR Donald C. Arthur, MC, USN

## Pathophysiology

### *Part two in a series*

The pathophysiology of cold exposure will be discussed in two sections, the first explaining the mechanisms by which the body attempts to produce and conserve heat and the second, the effects of progressive chilling on various vital body systems.

**Heat Production and Conservation.** Mechanisms of internal production and conservation of body heat can be categorized as either centrally or peripherally mediated.

The body can be thought of as a concentrically layered model where heat is produced by the core and muscle layers and is either lost or conserved by the surrounding fat, skin, and clothing layers.

Each of the body's thermoregulatory mechanisms will affect one of these layers. Centrally, when the preoptic anterior hypothalamus (POAH) receives cold stimuli, conservation of heat is effected by the sympathetic nervous system which acts in three ways. First, and most importantly, the peripheral vascular supply is constricted. This vasoconstriction acts to convert the skin and subcutaneous tissues including fat into a relatively avascular insulating layer. This hypoperfused layer conducts heat at a rate of only one-fourth that of normally perfused

tissue. An additional effect is to allow the periphery to cool, thereby decreasing its metabolic need for oxygen and nutrients. Even though the metabolic need is decreased, cell activity is still maintained, though at a lower level. As vasoconstriction delivers less oxygen to these tissues, lactic acid is produced as a result of anaerobic metabolism. This lactic acid could be a source of physiologic problems upon rewarming, as will be discussed later. Peripheral vasoconstriction is the most important mechanism of heat conservation. In addition, its action preferentially perfuses the most vital organs—those in the core. This shunting allows the heart and brain to be supplied with nutrients and oxygen at levels nearer to normal than other tissues. It is interesting to note that the body acts to prevent irreversible injury to an extremity by intermittently interposing brief periods of vasodilation to allow limited perfusion to reenter the extremity. This, however, will also allow more heat to be lost when the vessels are dilated—a double-edged sword.

The second sympathetic nervous system mechanism of conservation is the abolition of sweating which decreases the evaporative/convective heat loss. The third mechanism is piloerection, a substantial factor in other mammals such as the Alaskan

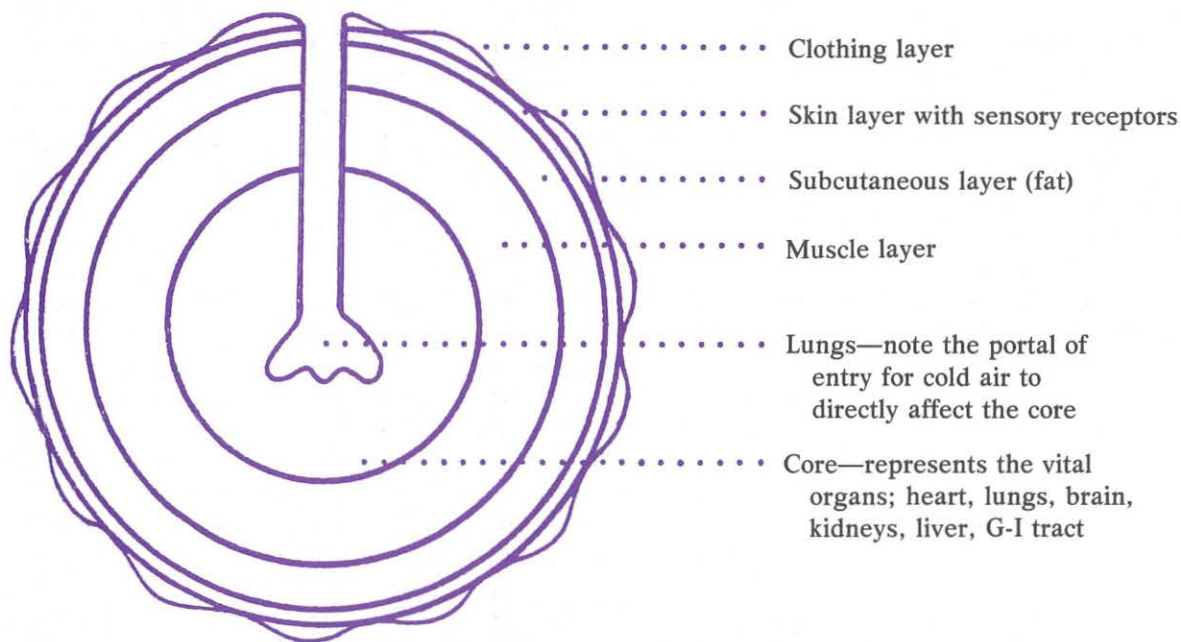
Husky, but inconsequential in man, a mammal with only minimal body hair.

The central nervous system also acts to increase heat production both by direct (motor) and indirect (hormonal) mechanisms. Under cold stimulation, the POAH causes the motor control center of the brain to increase muscle tone to the point of causing random contractions, the force of which is proportional to the cold stimulation. This is shivering and—for a while—it can dramatically increase heat production. Shivering generates a large quantity of heat but it also consumes a larger amount of energy in so doing and will quickly exhaust the victim. Shivering begins at core temperatures around 97°F and will cease between 90-85°F as the contractions become constant, resulting in muscular rigidity. Clinically, one can judge that a man is cold when he begins to shiver, but one should be even more concerned when he stops!

Hormonal mechanisms which increase heat production include the cellular effects of epinephrine, norepinephrine, growth hormone, and thyroxine. Epinephrine also acts

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as a peripheral vasoconstrictor assisting the central mechanism. The effects of epinephrine and norepinephrine can be acclimatized; that is, their effects would be more rapid and effective with repeated cold exposures. At approximately 95°F core temperature, the metabolic rate might be increased to six times that of the basal rate.

Peripheral heat maintenance is via two mechanisms. First, through a central feedback mechanism, peripheral temperature receptors act to reset the thermostat located in the temperature regulating center (TRC). In other words, if the peripheral receptors are exposed to extreme cold, the central effect might be to "reset" the TRC to a desired temperature higher than normal. This would prevent the central thermostat from shutting off when the core temperature returns to near normal, even though the body might still be under thermal stress. This action of central thermostat resetting is discussed here under peripheral mechanisms because the stimulus and regulation of the degree of resetting is controlled by the amount of peripheral stimulus received. An argument can also be made for its in-

clusion as a central mechanism. It is, in fact, an integration of both peripheral and central controls.

The second peripheral mechanism is via local spinal cord reflexes which decrease sweating and mediate local vasoconstriction in the cold-affected area.

The mammalian diving reflex is of interest to studies of drowning and accidental sudden immersion in cold water. It is a complex of reflex bradycardia, apnea, and selective perfusion of the heart and brain. Its usefulness is normally restricted to diving mammals which can remain submerged for 30 minutes by virtue of the heat-conserving and metabolic-slowing effects of this reflex. Its only human usefulness is in victims of sudden immersion in cold water. The reflex is initiated when the "snout" area (nose and mouth) is immersed in cold water. There have been many documented cases of immersions for over an hour where the victims have survived because of the heat preservation and selective sparing of perfusion to the heart and brain. This reflex has also occasionally been used in the treatment of some abnormal heart rhythms in a controlled hospital setting. There is, however, no benefit

derived from the mammalian diving reflex in normal diving operations.

**Effects on Vital Organs.** In addition to affecting heat production and conservation, body defenses act on all vital organ systems. Efficiency and effectiveness are increased in essential systems such as the heart, lungs, and brain. Functioning of the other, nonessential organs is reduced in an effort to conserve energy and heat. In time, however, with progressive heat loss, both normal and compensatory functioning are compromised and a precipitous deterioration in vital signs occurs.

Reference will be made to approximate core temperatures at which various effects will be seen. It is important that the reader realize that these are only approximations and can vary by 5-10°F depending on the individual. The effects are extremely variable and the temperatures given are intended to indicate a range rather than a specific number.

### Central Nervous System

The effects of cold on the central nervous system can closely mimic Type II decompression sickness as they cover a wide spectrum of mani-

festations. Even before the core temperature drops below 95°F (the cutoff for clinical hypothermia), tests of higher functions reveal subtle decrements in arithmetic tasks, logic, word recall, word recognition, and dexterity. As chilling continues to near 90°F, cerebral impairment can take the form of analgesia and hallucinations. Hypothermia victims have been recovered in mountainous climes by following a trail of their clothing as they hallucinate a feeling of warmth and well-being, shedding their clothing in their last few minutes of life. Memory impairment is also commonly seen at 90°F. Cold narcosis, a feeling of well-being, is commonly seen at 85°F. By 80°F core temperature, reflexes, including the pupillary light reflex, are absent and the victim will not understand when spoken to. Below 80°F obtundation and frank coma are common.

Permanent brain damage is uncommon owing to the relative preservation of blood flow to the brain and to its relatively low metabolic requirement. As long as minimal perfusion is maintained, permanent damage should be avoided. There have, however, been cases of epilepsy and dysphagia reported after recovery from severe hypothermia. These are extremely rare and thought to be due to some greater local ischemia in the areas of the brain responsible for these functions. The explanation for these local effects may be the increased tendency for the cooled, slow-moving blood to form clots and occlude small vessels.

Conduction velocities for peripheral nerves are also reduced, to one-half by 75°F and to one-quarter by 70°F core temperature. Below 70°F nerve conduction is virtually absent. Remember that the extremities will be colder than the core; hence the effect will be evident peripherally first. Finely coordinated movements of the hands and feet such as manipulation of tools or walking require rapid travel of primary motor and

feedback impulses. Clumsiness and difficulty walking are early indications of impaired neural transmission, evidenced after diminution of conduction velocities by only a few percent of normal. These are important early signs.

### Respiratory System

The respiratory response to sudden immersion in cold water is severe and uncontrollable hyperventilation to over 90 liters per minute (as compared with the normal 10 liters per minute) which can eliminate so much carbon dioxide that the respiratory drive is abolished. When hyperventilation is controlled, the victim may not have a stimulus to respiration, thereby inducing apnea. Complicating this is the high probability of inspiring water with these uncontrolled deep breaths. Hyperventilation is also a response when the victim is slowly cooled as in diving operations, but to a much milder degree and only initially. The carbon dioxide depletion of hyperventilation is coupled with the decreased carbon dioxide production due to tissue cooling and generalized slowing of cellular metabolism. These two mechanisms act insidiously to decrease the central drive to respiration leading to decreases in respiratory frequency and tidal volume. This results in lowered oxygen transported to the tissues and a combined metabolic and respiratory acidosis as metabolic waste products accumulate. Respiration of the severely hypothermic patient must be assisted during resuscitation to avoid this acidosis which can couple with the hypothermia in decreasing the effectiveness of treatment.

Local bronchial cold effect and decreased function of the vagus nerve act together to cause bronchodilation which increases the physiologic dead space (the area of the lungs which contains air but where there is no exchange of gases with the blood). This further reduces the amount of

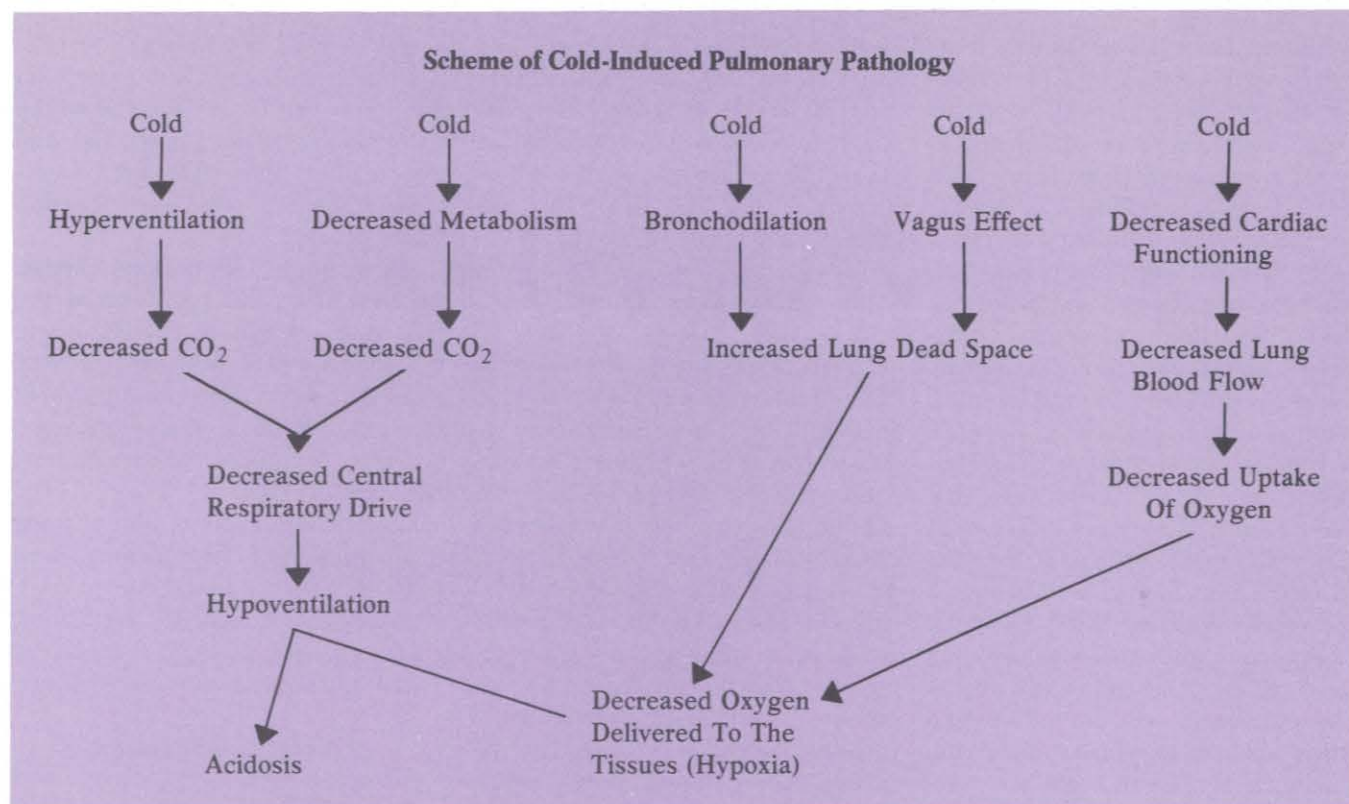
useful new air reaching the alveoli. Add these mechanisms to a decreasing pulmonary blood flow due to the decreasing cardiac output and one can readily appreciate the devastating decline in pulmonary function which occurs.

Interestingly, respiratory rhythm appears to be lost only toward the final stages of hypothermia. The rate may decrease to only two or four respirations per minute, but they will be regular. Below a core temperature of 75°F, however, chaotic respirations are the rule.

Direct cold effects on the alveolar and bronchiolar epithelium have been thought to predispose to post-resuscitation infection. Antibiotics, therefore, are often prescribed as part of the post-resuscitation therapy.

### Cardiovascular System

The initial response to cooling is an increase in blood pressure and heart rate as a result of vasoconstriction and shivering. As shivering ceases and the core temperature continues to drop, the heart rate follows in a linear fashion. The amount of blood pumped by each stroke (the stroke volume) remains fairly constant. This causes a net decrease in cardiac output (the amount of blood pumped each minute) and resultant decrease in tissue perfusion. Even at core temperatures of 70°F, where the cardiac output is reduced to only 20 percent of normal, the heart and brain are still receiving as much as 40 percent of their normal supply owing to preferential shunting of the blood supply by peripheral vasoconstriction. The mechanism for this decrease in cardiac performance is slowed electrical conduction within the myocardium, analogous to the slowed conduction within the nervous system discussed earlier. This slowed conduction is evident in the electrocardiogram (EKG) by a prolongation of all portions of the P-QRS-T complex and T-wave inversion. At around 85°F an extra wave appears within



the QRS complex and is known as the J wave.

At core temperatures below 85°F atrial fibrillation usually occurs spontaneously and ventricular irritability is greatly increased. This makes the ventricles extremely susceptible to fibrillation also, especially between 85°F and 77°F. Fibrillation may occur spontaneously in the ventricles as well or may be triggered by only slight trauma such as movement of the victim. If the heart escapes fibrillation in this period, the heart rate will continue to decrease until all activity ceases. In patients undergoing clinically induced hypothermia for heart surgery, heart rates of 4 per minute at core temperatures of 52°F have been recorded with complete cardiac standstill occurring at 50°F. These patients recovered fully from the hypothermia upon rewarming.

The net cardiac effects are a transiently increased blood pressure and heart rate followed by a progressive decrease in blood pressure and heart

rate until cardiac failure occurs by either ventricular fibrillation or gradual standstill. Blood pressure usually is not obtainable below around 85°F. The victim may be pulseless and without a blood pressure; however, he may still be resuscitatable due to the preferential perfusing of vital organs and a generalized slowing of cellular metabolism with decreased oxygen and nutrient requirements of all cells.

It is important to note that these cardiac effects are refractory to drug therapy. Drugs have markedly diminished effects in hypothermia and their administration would not only be futile but dangerous because they cannot be eliminated from the body as will be discussed soon.

#### Gastrointestinal System

Radiologic studies have demonstrated intestinal paralysis as a result of hypothermia. This response occurs early, around 95°F, as an immediate

effect of blood flow redistribution and sympathetic nervous system response. This explains why resuscitated hypothermia victims will often complain of abdominal cramping. The gastrointestinal mucosal lining is also a very susceptible target of cold stress. Decreases in mucosal blood flow, as well as stasis and clotting within small vessels, result in hemorrhages and ulcerations. These are often called Wischnevsky ulcers and represent a type of stress ulcer.

This paralytic ileus coupled with vascular compromise and hemorrhage has been linked to the high incidence of pancreatitis found in victims of severe hypothermia. The severity of pancreatitis presents a spectrum from elevated amylase levels recorded in mildly hypothermic patients to severe hemorrhagic pancreatitis seen in the more severe, fatal cases.

The liver, in contrast, is an organ relatively resistant to damage by cooling. Minor changes in liver cells

have been demonstrated but are generally reversible. One such change is the rapid (within 2 hours) depletion of glycogen from liver cells as it is quickly catabolized to glucose for use as a ready emergency energy source for heat production. Just as the metabolic rate of all cells is decreased, the liver is no exception. Because the liver is uniquely tasked with breakdown and elimination of metabolic wastes and toxins, these by-products of metabolism tend to build up. Most notable of these is lactic acid. The most important effects of increased lactic acid are that utilization of oxygen by cells is impaired and myocardial irritability is increased. Catabolism of drugs is likewise impaired. Therefore, if drugs are administered early in the resuscitation effort, before the target organ is able to respond to the drug, the drugs will accumulate and remain in their active form. As the resuscitation progresses, the actions of these drugs will be manifest and will be difficult to control until the liver recovers enough to metabolize them. Therefore, the administration of drugs early in hypothermia resuscitation is contraindicated.

### Renal System

Exposure to immersion temperatures around 60°F is sufficient to elicit a diuresis. This diuresis is partially responsible for the hemoconcentration which will be discussed shortly. The resultant dehydration will require treatment during the resuscitation. Two mechanisms have been proposed for this diuresis. First, decreased reabsorption of the initial plasma filtrate has been proposed due to the decreased metabolic activity of the renal tubular cells responsible for reabsorption. Second, diuresis may be triggered by the false sensation at the kidney of too much blood volume as a result of visceral pooling as peripheral vasoconstriction squeezes blood into the core from the extremities.

The opposite effect, that of oliguria, is seen with prolonged exposure to water temperatures around 85°F. This effect is due to necrosis of tubular cells and occurs primarily in the elderly. It is of little importance in consideration of diving casualties.

### Endocrine System

Increased activity of almost all endocrine glands has been demonstrated as a result of exposure to cold. Blood levels of cortisol (a steroid) are increased. The thyroid hormone, thyroxine, is secreted in higher amounts resulting in an increased metabolic rate. The adrenal medulla increases secretion of epinephrine and norepinephrine (the former at a rate greater than the latter) in direct proportion to the degree of chilling. The epinephrine and norepinephrine effects are immediate. The other hormonal effects have significant delays from stimulus to secretion and from secretion to effect.

### Blood

Hemoconcentration occurs in response to cold stress via two mechanisms. First, cold diuresis results in a diminished plasma volume as discussed earlier. Second, the permeability of vascular endothelial cells is increased, allowing plasma to leak into extravascular spaces. This increased fluid in the tissues is called edema. The degree of hemoconcentration is directly proportional to the degree of chilling. An increase in hematocrit reflects the degree of hemoconcentration and is correlated with the degree of increased blood flow resistance as a result of the increase in blood viscosity.

The oxyhemoglobin dissociation curve is shifted to the left by the effect of cold alone. In other words, hemoglobin, the oxygen-carrying molecule in red blood cells, tends to hold onto oxygen more avidly and not readily allow its use by the tissues.

This causes a condition of relative anoxia where there is more oxygen available than can be effectively released to the tissues. This effect is somewhat compensated for by the increasing acidosis which has the opposite result, that of allowing easier transfer of oxygen from hemoglobin to the tissues. The net effect lies somewhere between the two.

Hyperglycemia occurs during the early phases of hypothermia owing to the glycogen mobilizing effects of the glucocorticoids (steroids) and epinephrine on the liver glycogen stores. Soon, however, liver glycogen stores are depleted and hypoglycemia results. This is followed by increases in plasma-free fatty acid and glycerol levels as fat stores are next to be mobilized as an energy source. This is caused by the lipolytic (ability to break down fat) effect of epinephrine and norepinephrine on fat cells. Mild ketosis results as with all metabolism dependent on fat as an energy source. The effects on lipid metabolism are not as immediate as those on glycogen stores.

Electrolyte disturbances are seen in severe hypothermia as water and sodium are driven into cells and potassium is forced out. This results in tissue edema, mild diminution of serum sodium (compensated for by hemoconcentration and dehydration), and increased serum potassium levels.

Clotting tends to occur more readily within the small arterioles as the viscosity increases, the platelet count increases, the rate of blood flow decreases, and thrombogenic compounds such as histamine and various kinins are released by direct action of cold on the cells. As microclots form, occlusion of small vessels results in damage to vital organs such as the brain (stroke), heart (infarction of myocardial tissue—heart attack), and the gastrointestinal tract (stress ulcers). These effects are usually not seen until the core temperature slips below 80°F.

(To be continued)

# Medical Department Announces New Policy on Sickle Cell Trait

CDR Frederic L. Jackson, MC, USN

Recent changes in medical standards have removed occupational restrictions on many sickle cell trait (SCT) carriers. This article gives background information on the policy changes and describes Navy Medical Department responsibilities necessary for compliance.

On 16 Jan 1981, the Deputy Secretary of Defense ordered the military services to remove all occupational restrictions previously placed on individuals with SCT. (1) At the same time other actions were directed to evaluate the effect of the policy change.

The Uniformed Services University of the Health Sciences (USUHS) was directed to develop and perform an epidemiological monitoring study to collect additional scientific information about SCT in the military. The study was to be a cooperative effort between all three service Medical Departments and USUHS. The question to be answered was "To what extent, if any, are personnel with SCT at increased risk of sudden death, catastrophic illness, or medical disability as a result of their participation in heretofore restricted [occupational] specialties?"

The Navy was directed to prepare a technical bulletin which would be a field guide to the pathogenesis and diagnosis of SCT and other hemoglo-

binopathies, and erythrocyte enzyme deficiencies. It would also include basic educational and counseling guidelines on SCT and glucose-6-phosphate dehydrogenase (G-6-PD) deficiency.

All the services were directed to begin universal testing of all personnel for SCT and for G-6-PD deficiency. As of today, the Navy is the only military service in complete compliance with the DOD directive.

The history of the SCT issue in Navy medicine is long, involved, and sometimes controversial. Through universal agreement, people with sickle cell anemia or mixed hemoglobin-S abnormalities have been disqualified from military service. The issue with SCT carriers has been less clear-cut, therefore somewhat more emotional.

Prior to 1981, Navy policy was to restrict SCT carriers from aviation programs such as flying, parachuting, and pressure chamber technicians, and from diving duty. (2) There were no restrictions placed on academy assignment, submarine duty, air controller duty, or any other Navy or Marine Corps occupations. The other military services had similar policies, including an Air Force exclusion from the U.S. Air Force Academy. Previous studies have shown no increased risk to SCT carriers under conditions of general service with the Navy and Marine Corps. (3,4)

The exclusionary policies were based on the theory that SCT carriers were susceptible to intravascular

sickling under sufficient hypoxic stress. Although there existed a small body of scientifically sound data in support of the exclusion, (5-8) much of the information was anecdotal or incomplete. Committees convened by the Federal Aviation Administration, the Deputy Assistant Secretary of Defense (Health Affairs) (DASD-HA), and the Bureau of Medicine and Surgery in the 1970's similarly could not define the exact degree of individual or military risk posed by SCT. (9-11)

Polls conducted by the Surgeons General of the Army and Air Force and the DASD-HA of prominent civilian and military hematologists showed general disagreement over the amount of risk to a SCT carrier exposed to hypoxia. Since no animal model for SCT exists, carefully controlled in vivo experimentation has been impossible. All-in-all, there was no solid scientific argument against the policy change. After discussion the services and DOD agreed on a middle ground policy that would allow the services to build a pool of low risk SCT carriers for observation while satisfying DOD's desire for an expansion of career opportunities. On 18 Aug 1981, the Navy removed all occupational restrictions on SCT carriers with 41.0 percent or less hemoglobin-S. (12)

To implement the DOD policy change several steps have been taken which are the direct responsibility of the Navy Medical Department. These are spelled out in the new BUMED-

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INST 6260.26, dated 27 Nov 1981. The goals of the instruction are:

- to insure that all naval personnel are screened for SCT and G-6-PD and, if they are positive, that they be educated about the condition,
- to insure that applicants for special duty programs are well counseled prior to entering their special duty training, and
- to insure that the Navy adequately supports the USUHS SCT monitoring protocol.

The instruction designates regional testing facilities, assigns responsibility for preparing educational programs on SCT and G-6-PD, lists acceptable educational material to be used for educational programs, assigns the responsibility for special duty counseling, and establishes procedures for health monitoring and reporting of individuals involved in the USUHS study protocol.

Publication of the technical bulletin on SCT and related hemoglobinopathies directed by DOD is expected in early spring. It is Technical

Bulletin (Medical), Navy publication #P-5126, entitled "Hemoglobin Variants and Erythrocyte Enzyme Deficiencies." It describes the most common hemoglobin variants, discusses diagnostic criteria, and presents suggestions for education and counseling of affected individuals.

Although these changes in policy and procedures may require some additional work in the short term, the long-term results will be worth the effort. We hope to resolve once and for all the question of whether SCT poses an increased risk to individual health or to military operational readiness in special duty occupations such as flying, parachuting, diving, and pressure chamber operations. In so doing, we will insure that all Americans have equal opportunity to serve in occupations of their choice in the U.S. Navy.

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9. National Academy of Sciences National Research Council: *The S-hemoglobinopathies: An evaluation of their status in the armed forces*. Washington, DC, National Academy of Sciences, 1973.
10. Federal Aviation Administration Report #FAA-AM-76-15.
11. BUMED memo BUMED-0012/451:abt, 3920 of June 1978.
12. CHBUMED msg 181430Z Aug 81. □

## Student Paper Competition

Graduate and undergraduate students currently enrolled in a degree-granting program, as well as students enrolled in an accredited medical specialty training program, are eligible to enter the paper competition for computer applications in medical care. Residents who have a doctorate in another field and physicians certified in a medical specialty board are *not* eligible.

Papers should express original ideas in areas of medical informatics, medical computing, or computer medicine.

The 10 finalists' papers will be presented at the Sixth Annual Symposium on Computer Applications in Medical Care to be held 30 Oct-2 Nov 1982 at the Sheraton Washington Hotel, Washington, DC. The top three finalists will receive cash prizes in the amounts of \$1,000, \$600, and \$400.

For notification of intent to submit a paper write to: Helmuth F. Orthner, Ph.D., Department of Clinical Engineering, George Washington University Medical Center, 2300 K Street, NW, Washington, DC 20037. The deadline is 1 June 1982.

For further information call: Janice W. Eldridge, (202) 676-8928.

# Corpsmen Who Teach the Aviators



*Going over it one more time: An aviation student gets some last minute instruction in a portable ejection seat simulator before . . .*

The day is clear with just a hint of overcast at 3,000 feet. An A-7 pilot, on a practice overwater mission, has his target in sight. He releases his ordnance but accompanying the usual jolt there is a loud, unexpected bang followed by vibrations that threaten to tear the aircraft apart. Warning lights flash red on the instrument panel and engine RPMs drop rapidly. With 60 nautical miles to "homeplate," the pilot has only one option—eject!

He radios his intentions to his wingman and quickly and thoroughly runs through the pre-ejection checklist he has gone over countless times in classrooms, in simulators, and in his mind. Harness locked, feet on the pedals, head positioned, elbows in, he reaches up and grabs the face curtain above his head. With one smart yank, the curtain slams down over his face and he rockets up and clear of the disabled aircraft. After a brief but busy parachute descent to the water, the pilot frees himself from his harness, climbs into an inflated life-raft, releases a dye marker, and activates the survival radio that will summon rescuers in a matter of minutes.

A casual observer might easily infer that the fortunate Corsair pilot owed his life to a marvelously designed and time-tested escape system. He would be half-right. The other essential ingredient he may not have considered is training. Realistically, this aviator, like other Navy pilots and aircrewmembers, owes his life to the corpsmen who taught him to use his survival equipment and who periodically refresh him in its proper use.

Who are these corpsmen who teach the aviators? They are the Aerospace

Physiology Technicians (APT—HM8409), an elite group of professionals whose duties go far beyond lecturing pilots about ejection seats. Although their primary function is teaching the physiological hazards of flight, APTs also operate and maintain the low pressure chambers that enable aviators to recognize and deal with high altitude conditions, ejection seat trainers, flash blindness trainers, and other survival training devices at 13 Aerospace Physiology Training Units (APTUs) in CONUS and Hawaii. [APTs assigned to the APTU at Pensacola, FL, soon will man the new Multi Station Disorientation Device (MSDD), a computer-controlled trainer that creates disorientation and vertigo.]

Other APTs are assigned to support aerospace physiologists engaged in research at Navy research and development facilities.

At APTUs teaching water survival, at least one APT is qualified as a water survival instructor and monitors the use of water survival training devices such as the Dilbert Dunker, helo dunker, parachute drag, underwater breathing device, parachute disentanglement trainer, and the parachute landing trainer.

### Jack of all Trades

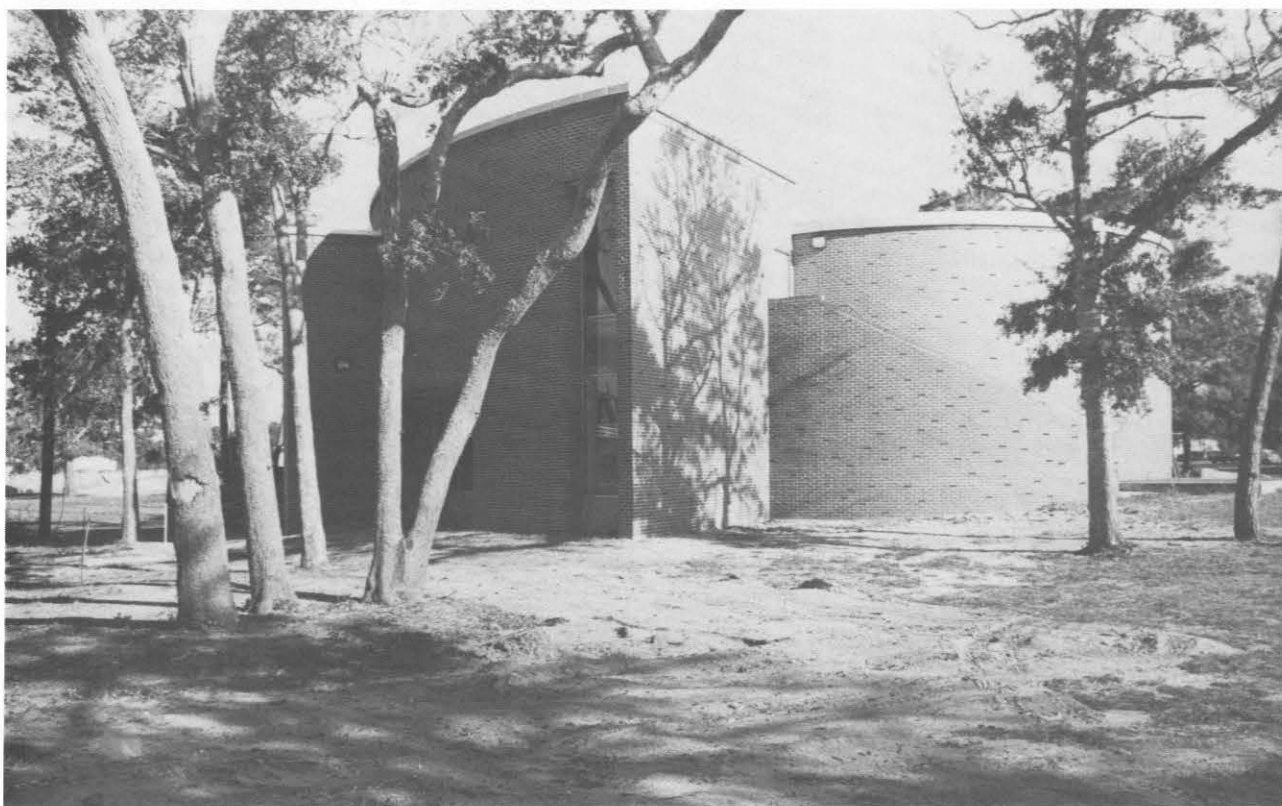
If one word could describe the Aerospace Physiology Technician it would have to be versatility. "Being an APT is much more than being a general service corpsman," says CDR W.W. "Mac" McIntosh, MSC, head of the Aerospace Physiology Training Unit in Pensacola. "We offer our people a lot of variety. They 'ride' the chamber, teach water survival, maintain the equipment, and do research and literature reviews. In



... getting his "seat shot" in the compressed air-driven model.



*The Multi Station Disorientation Device (MSDD) and the new building at Pensacola that houses it. As the main platform revolves, each of the 10 capsules can be rotated 180 degrees in either direction on its own vertical axis. This computer controlled system can create varying degrees of disorientation and vertigo.*



short, they do something different throughout the day." When assigned to permanent duty at Naval and Marine Corps air stations, many APTs, in addition to their regular jobs teaching the aviation community, have even found themselves helping to repair and rig parachutes. What they don't get to do very often is go to sea. The APT is primarily a shore-based rate.

### Teacher

These duties aside, many APTs spend a good portion of their days either preparing material or lecturing pilots, naval flight officers, and enlisted aircrewmembers on aviation physiology. The subjects are many: biodynamics of acceleration and deceleration (g-forces, g-tolerance, impact accelerations), the biodynamics of ejection, disorientation and vertigo, laser safety, hearing conservation, sensory deprivation, and the use of personal life-support and survival equipment, e.g., ejection seats, oxygen systems, helmets, g-suits, flare guns, radio beacons, inflatable life vests and rafts, and emergency medical kits.

Many APTs find teaching the most rewarding if not the most demanding aspect of their jobs. "It's hard to stand in front of a group of 30-80 people and not know what you're talking about," says HMC Roger Rich, senior APT at Pensacola. "You've got to be prepared." Adds HM1 Rich Beaudoin, also of APTU Pensacola, "The challenge is to motivate your students to follow the recommended procedures, whether it's using a scan technique to prevent vertigo or teaching them to wear their life support equipment properly so it will function in an emergency."

What Rich, Beaudoin, and their colleagues teach must be relevant and current. Memorizing and giving the same lecture time after time simply won't do. The instructors have to read, research, and become totally familiar with their material, much of which comes from sources other than

textbooks. Each scans the weekly message traffic for examples of actual ejection and survival episodes that may appropriately and graphically illustrate a lecture.

There is also the knowledge of aviation that comes from associating with aircrewmen, pilots, parachute riggers, life support equipment people, and squadron corpsmen. And there is that authority that derives from the experience of flying itself. "It's hard to talk about motion sickness or disorientation unless you've been there," points out CDR McIntosh. And many of the APTs have been there, flying in the back seats of F-4s, TA-4s, A-6s, antisubmarine warfare aircraft such as the S-3 and P-3, and many types of helicopters.

### Selection and Training

Becoming an Aerospace Physiology Technician is a rigorous process. Applicants must be at least an E-4 and no higher than E-7. They must have a minimum GCT/MECH or ASVAB WK/MC score of 105 and pass a flight physical. Applicants must be Aviation Medicine Technicians (AVT—HM8406) or have been accepted for this specialty.

HMs coming into the aerospace medicine field for the first time enter the 10-week Aviation Medicine Technician school at Pensacola and upon completion are designated HM8406 to be assigned to a Navy or Marine Corps aviation unit. In either case they would assist the flight surgeon with clinical and administrative duties. Some 8406s might proceed directly to the 8409 school, which is an additional 4 weeks. (Candidates must volunteer for the 8409 school.) Upon graduation, they may, if qualified, go through the additional 5-week water survival instructor training course at Pensacola.

Assuming the applicants graduate from both the 8406 and 8409 schools and the water survival training course, the process could take up to 6 months. Once designated, the new APT can be assigned either to an

APTU or a research and development facility.\*

APT's are primarily a shore-based rate but, if desired, they can request and be assigned to squadrons or the Marine Corps as 8406s and return after one tour to the 8409 rate if conditions permit. "We think the individual who comes back as an 8409 after serving a tour as an 8406 makes a more well-rounded instructor," points out CDR Harold T. Pheeny, MSC, head of BUMED's Aerospace Physiology and Water Survival Technical Branch.

What does seem attractive about the 8406-8409 twin NECs is that because APTs maintain their 8406 primary NEC, they:

- maintain their Selective Reenlistment Bonus;
- remain operationally oriented and can serve a squadron tour with the Navy or the Marines; or
- can choose to stay an 8409, thereby assuring a shore-based specialty.

And because the APTs "ride" the chamber as inside instructors/observers, they are eligible to receive hazardous duty pay.

In short, Aviation Physiology Technicians are not locked into a static NEC but are free to move back and forth as conditions permit. This so-called closed-loop detailing is just one more attractive feature of an aviation-oriented Navy medical specialty that seems to have no shortage of exciting challenges.

For further information on the Aerospace Physiology Technician program, contact the Hospital Corps Detailers (NMPC-407), Autovon: 224-4547. —JKH □

\*APTU assignments include: Brunswick, ME; Patuxent River, MD; Norfolk, VA; Cherry Point, NC; Jacksonville, FL; Pensacola, FL; Corpus Christi, TX; Whidbey Island, WA; Lemoore, CA; El Toro, CA; San Diego, CA; Point Mugu, CA; and Barbers Point, HI. Research and development facilities are NATC Patuxent River, MD, NADC Warminster, PA, and NMRL Pensacola, FL.

## Corpsman in the Classroom

*HMC Roger Rich is an instructor at NAMI's Aerospace Physiology Training Unit at Pensacola, FL. With 10 years and three assignments under his belt as an aerospace physiology technician, the Illinois native is eminently qualified to teach the many subjects naval aviators and aircrew members must be proficient in. "It's easy to dazzle the newcomer," he says, but keeping the material current and relevant for the veterans, who are required to take periodic refresher training, is the real challenge.*

U.S. Navy Medicine recently spoke with Chief Rich about his role both as a corpsman and an instructor.

**USNM: How long have you been an aerospace physiology tech?**

**HMC Rich:** About 10 years—5 at Norfolk, 3 in Hawaii, and over 2 here at Pensacola. Each place has had a totally different environment. At Norfolk we gave a lot of refresher training. But what I really fell in love with there was the water survival program. I spent a good part of my day in a swimsuit. Besides teaching I could jump in the water and demonstrate the techniques I taught in the classroom. Water survival wasn't very standardized at that time and I had a chance to help develop the program, even writing manuals and putting together slide presentations.

**How was your Hawaii assignment different?**

At Barbers Point we had a smaller unit and I got out to the squadrons more. The routine was varied—water survival, safety

lectures. Being the only physiology training unit in Hawaii, we had an opportunity to train Army, Air Force, Marine Corps, and Coast Guard personnel as well as our own people. I got a lot of hands-on experience with Air Force equipment and procedures. At a small unit you must be versatile. An APT has to be an expert with ejection seats as well as with survival, water survival, sensory, and physiology. He also has to be a mechanic. There's a lot of equipment to maintain.

**What are you doing here at Pensacola?**

We are exposing our APTs to more maintenance of oxygen systems and ejection seats. For example, if an APT gets orders to Barbers Point or a small unit somewhere else, he may, in fact, have to run maintenance on oxygen systems or chambers. We have set up a program here where we slowly rotate everyone through all areas. When they get orders they can handle almost anything.

**Besides teaching and maintaining the equipment you mentioned, does an APT ever get to fly?**

I don't get to go up much any more. There's just not enough time in the day. When I first got into this field I did quite a bit. I flew on anything that got off the ground. There's no guarantee you'll ever get on an airplane, but your training and position opens doors. You make a lot of contacts in your classes and on safety stand-downs. If there's an empty seat and they know you're looking, you can get on most any aircraft. I encourage the people here to get

up occasionally, even if it's just on a helo. It gives them the opportunity to see how an aircrew works and the experience is helpful for the type of training they must deal with in the classroom.

At Norfolk I used to go through a lot of water rescue operations. Anything I teach I try to turn around and at least put myself in that environment. A student might question a point you've made and you can honestly say, "I've already tried that approach four times and it just doesn't work and here's what's wrong with it." As soon as that student knows that you've been in the same environment, what you are teaching becomes much more credible.

**What subject is the most fun to teach?**

Sensory. I like to call it a road show. You can give people the illusion they're moving when they're sitting still, they see lights moving that really aren't. You get to create all kinds of illusions. It's almost like a magician thrilling a crowd.

**What is the most difficult subject?**

I'd have to say the ejection seat simply because ejecting from an aircraft is not a routine experience for aviators. It's an unpleasant possibility most would rather not think about. And that's what really makes it a challenge to teach. As an instructor you have to make them think about it seriously.

**How do you do that?**

By keeping current. We see the message traffic on a daily basis. It reports aviation accidents all over



*HMC Rich*

the world. We also dedicate x number of hours a week reading aviation literature. All this background gives us plenty of examples of proper and improper technique to talk about in class. It also makes the lectures much more effective. You have to stay in their world, especially in the refresher lectures. If you don't, it becomes the same old stuff they heard last year, and then your've lost them.

**The thing that keeps cropping up over and over is the versatility of the APT. Although he sounds like the jack of all trades he's still basically a corpsman.**

Even though I've done everything from maintenance to engineering of the devices themselves, at times I've become very much the corpsman. Squadrons get to know you as someone who knows aviation. But you're also the expert on weight control or hear-

ing conservation. At some stations you run the weight control or hearing conservation programs for the aviation personnel. Yet you're still a corpsman whose main function is to be involved in preventive medicine.

**You don't seem to be teaching a homogeneous group here but rather quite a variety of personnel.**

We have given lectures to congressmen, the CNO, and even the Secretary of the Navy,\* who we trained this year. Just about anyone who flies Navy aircraft goes through physiology training here or someplace. In Hawaii we even trained local flying clubs and lectured members of a Hawaiian airline on our own time. We've even been involved with the FAA

(Federal Aviation Administration) in training people on their regulations.

**Do you ever get any comments from students you may have taught originally and then came back for refresher training?**

It's happened several times. With water survival students you have to teach them to get in the habit of doing the right thing at the right time in the right order and doing it all automatically. I had one helo squadron at Norfolk that experienced two accidents. Three gentlemen from the two different accidents came back and personally thanked me, saying it was my techniques that had saved their lives. It makes you happy to think that there are three guys walking around out there because you taught them how to do it right. That's your pat on the back.  
—JKH

\*Secretary of the Navy John F. Lehman, Jr., is a commander in the Naval Reserve.

# SAC Addendum

The following is a compilation of Medical Corps specialties and the Medical Corps inventory as presented at the Surgeon General's 13th Annual Specialties Advisory Conference and Committees' Meeting but not published in the December issue of *U.S. Navy Medicine*.

## Total Medical Corps Strength—3,617 as of 30 Aug 1981

| Category        | Strength | Percent |
|-----------------|----------|---------|
| 2100—USN        | 1,177    | 33%     |
| 2105—USNR       | 2,440    | 66%     |
| Billets = 3,617 |          |         |

## Anticipated Increment in Medical Corps Billets—446

| Year | Billets | Change |
|------|---------|--------|
| 1981 | 3,617   |        |
| 1982 | 3,643   | + 19   |
| 1983 | 3,883   | + 240  |
| 1984 | 3,924   | + 41   |
| 1985 | 4,063   | + 139  |

## Medical Corps Billets by Claimancy

|               |       |
|---------------|-------|
| BUMED         | 2,884 |
| Marine Corps  | 219   |
| Fleet         | 249   |
| Other         | 265   |
| Total Billets | 3,617 |

## Medical Corps Total Authorized Billets

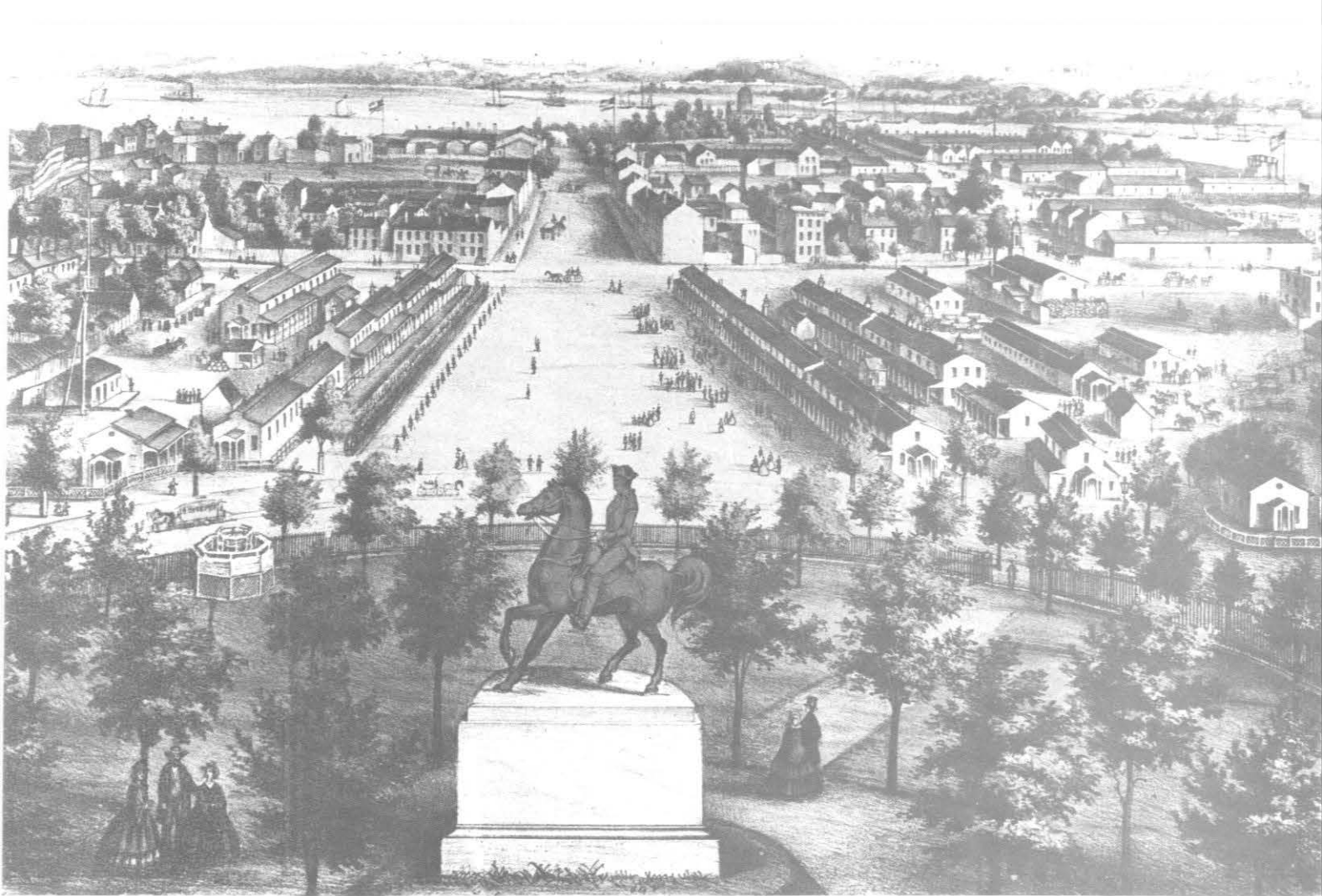
|                                                        |       |
|--------------------------------------------------------|-------|
| Assignable Billets                                     | 3,464 |
| Transients, Patients, Separations,<br>and Disciplinary | 153   |
| Total End Strength                                     | 3,617 |

## Nondeployable Forces as of 30 Aug 1981

|                                |       |
|--------------------------------|-------|
| Female                         | 313   |
| Males (Aliens)                 | 66    |
| Total                          | 379   |
| Percent of Total Medical Corps | 10.5% |

### Medical Corps Profile by Specialty as of 1 Oct 1981

| Specialty                       | Authorized Billets | Required | Inventory | Variance |
|---------------------------------|--------------------|----------|-----------|----------|
| Dermatology                     | 38                 | 45       | 39        | - 6      |
| Family Practice                 | 127                | 160      | 196       | +36      |
| Internal Medicine               | 215                | 270      | 315       | +45      |
| Neurology                       | 26                 | 25       | 26        | + 1      |
| Neurosurgery                    | 12                 | 24       | 18        | - 6      |
| Nuclear Medicine                | 6                  | 12       | 8         | - 4      |
| Obstetrics/Gynecology           | 111                | 155      | 111       | - 44     |
| Ophthalmology                   | 45                 | 52       | 57        | + 5      |
| Otolaryngology                  | 50                 | 55       | 49        | - 6      |
| Pathology                       | 68                 | 83       | 98        | +15      |
| Pediatrics                      | 158                | 215      | 213       | - 2      |
| Plastic Surgery                 | 7                  | 14       | 8         | - 6      |
| Psychiatry                      | 92                 | 120      | 111       | - 9      |
| Preventive Medicine (Gen/Occup) | 36                 | 42       | 31        | -11      |
| Preventive Medicine (Aerospace) | 48                 | 55       | 37        | -18      |
| Radiology                       | 91                 | 129      | 94        | -35      |
| Thoracic-Cardiovascular Surgery | 12                 | 25       | 18        | - 7      |
| Urology                         | 35                 | 60       | 33        | - 27     |
| Orthopedic Surgery              | 79                 | 155      | 75        | - 80     |
| General Surgery                 | 120                | 163      | 111       | - 52     |
| Anesthesiology                  | 86                 | 130      | 101       | - 29     |



Columbia Historical Society

*Foggy Bottom in 1865 looking down 23rd Street from Washington Circle. The Observatory dome is in the right background.*



Columbia Historical Society

*Some of the Observatory's wartime neighbors: Troops of the 9th Veterans Reserve Corps in formation outside their Camp Fry barracks near Washington Circle.*



# Home of BUMED

a hilltop in foggy bottom

## The Gilliss Legacy

*Part three in a continuing series*

A warm and steady summer rain could not wash away the fear and uncertainty that gripped Washington the July morning after Bull Run. The muddy streets and grimy alleys seemed even more so as beaten and exhausted men drifted back across the Potomac from Virginia. They were no longer soldiers, having abandoned their units and their weapons in the wild flight from the battlefield less than 25 miles away.

What had begun as a lark had ended in disaster. The powder-stained faces with the glazed expressions told the story. War had come to Washington and before it would end 4 years later, the Capital would become a garrison town, never but a few miles from the front. Its homes and government buildings would first become barracks and then makeshift hospitals to accommodate thousands of sick and wounded. And the population would swell, not only with the unruly soldiers who clogged its streets and bars, but with hundreds of new bureaucrats to help run the war machine, and gamblers, doctors, nurses, lobbyists, sutlers, contractors, prostitutes, spies, and profiteers—the inevitable and disparate masses that only war seems to bring together.

At the Naval Observatory, things were not quite as they had been. Maury “the traitor” was gone and LT James M. Gilliss, the understudy, who arrived 3 days after Maury left for Richmond, was now in command. A full 17 years had passed since he built the Observatory and was passed over for the superintendency.

The outbreak of war depleted the staff as officers were reassigned to a Navy greatly increased in size. Those who remained were busy enough trying to keep up with the punishing workload. President Lincoln’s call for a blockade of the South meant that hundreds of current navigation charts depicting the shoreline from Galveston to Norfolk had to be printed and disseminated. Countless steering compasses, liquid boat compasses, artificial horizons, barometers, thermometers, spyglasses, sextants, and chronometers had to be purchased, checked for accuracy, and logged in before being assigned to the fleet.

By the fall of 1861 Gilliss had one lieutenant, an assistant observer, four professors of mathematics, an “acting master,” one clerk, an instrument maker, two watchmen, a groundkeeper, one porter, and a messenger on the staff. (1)

The wholly professional and eager

astronomer saw the irony of his situation. He had waited so many years to become chief of one of the world’s premier astronomical laboratories and now it seemed as though circumstances would allow little time for astronomy.

But Gilliss was not to be deterred. Despite the Observatory’s wartime commitments, he launched an ambitious new program of observations, hiring several new employees to help with the work. (2) In addition he decided to do something with the backlog of thousands of unrefined star and planet observations left over from his predecessor’s tenure; some dated back over 14 years. Gilliss lobbied for their publication and Secretary of the Navy Gideon Welles authorized the hiring of copyists to prepare the raw data sheets. The computations and final preparation would be left to private contract computers working under Professor B.A. Gould at Harvard College.

Gilliss, like his predecessor, also had other duties. Security for the compound was important but the new chief believed the Army could handle the rebels. An attack on Observatory Hill seemed quite unlikely. Several weeks after Bull Run he returned to the Washington Navy Yard the 10

rifled muskets and three boxes of ammunition Maury had stockpiled. Gilliss felt that two muskets, 80 cartridges, and 100 musket caps would be sufficient to defend the grounds. (3)

It was not the Confederates he was worried about, but rather his Foggy Bottom neighbors. Even before the war, a picket fence that protected the compound's northern exposure was the object of firewood gathering expeditions believed by Maury to have been led by local inhabitants. On the east side, part of the perimeter brick wall had fallen down and required immediate repair. And now there were many more neighbors to cause worry. The barracks of Camp Fry lined both sides of 23rd Street near Washington Circle. Soldiers

drilled on the rutted thoroughfare by day and caroused near it after dark.

Even what was not the troops' domain was somehow connected with the war effort. Foggy Bottom now had warehouses for Army equipment, and harness and blacksmith shops. Storage corrals filled with cavalry mounts and beef cattle made their noisy contributions.

"Across the Potomac," wrote Simon Newcomb, the Observatory's new Professor of Mathematics, "Arlington Heights were whitened by the tents of soldiers from which the discharges of artillery or the sound of fife and drum became so familiar that the dweller almost ceased to notice it." (4) The Nova Scotia-born Newcomb, who had joined the staff that first autumn of

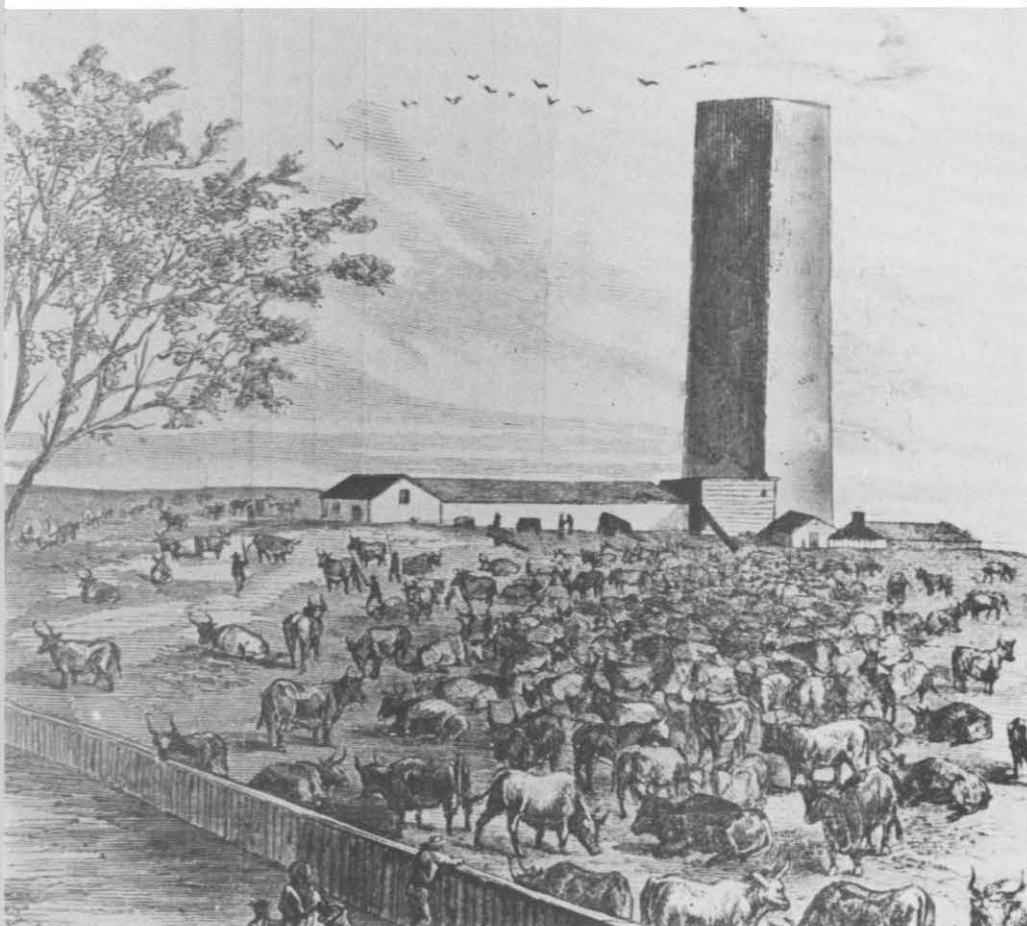
the war, did not live in the neighborhood. Neither did most of his colleagues. He walked some 2 miles to and from work. The intervening years did not dim his recollection of what he found along the way. "After a rain, especially during winter and spring, some of the streets were much like shallow canals. Under the attrition of the iron-bound wheels the water and clay were ground into mud, which was at first almost liquid. It grew thicker as it dried up, until perhaps another rainstorm reduced it once more to a liquid condition." (5)

Professor Newcomb was not the only new employee. By the summer of 1862 several new jobs were created. The new employees would aid those who were engaged in astronomical observations. Asaph Hall, a 33-year-old astronomer from Connecticut, after sending an inquiry to Gilliss, was advised that "the aides who will be appointed for the Observatory . . . will be required to give evidence of theoretical intelligence of the construction and adjustment of instruments and such mathematical knowledge as will enable them promptly to apply formulae used in the reduction of every class of astronomical observations." (6)

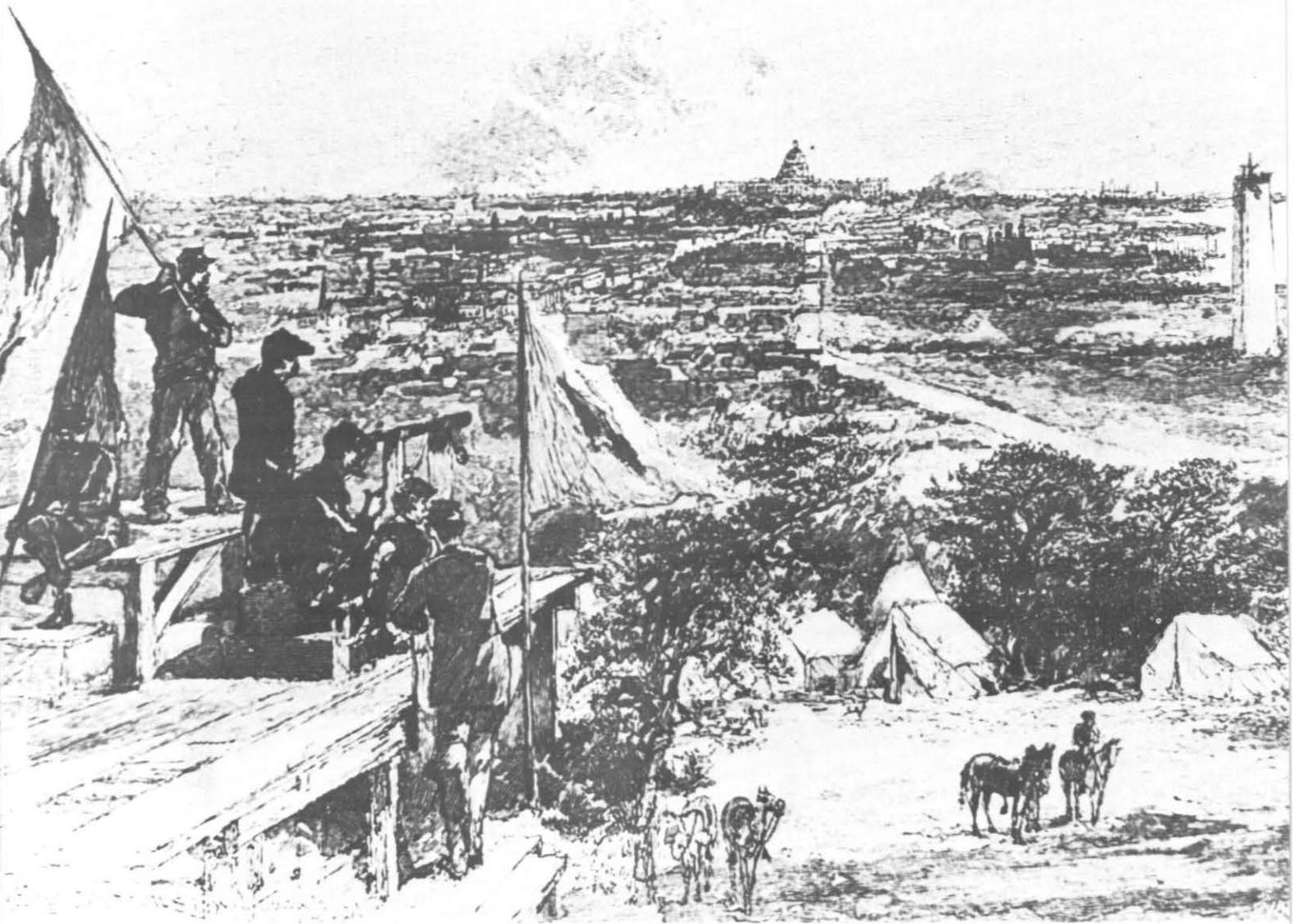
Eight days later Hall was hired after giving such evidence in an examination conducted at the Observatory. His first weeks on the job were not happy ones. He had to find suitable lodging in the city, no small task. Moreover, his disillusionment with government service came almost too quickly. To his wife he wrote: "When I see the slack, shilly-shally, expensive way the Government has of doing everything, it appears impossible that it should ever succeed in beating the Rebels." (7) He wrote contemptuously of the "American astronomy" practiced at the Observatory, a reference, no doubt, to loose discipline and the secondary role given to his science.

Simon Newcomb had already come to the same conclusions. He had seen Gilliss following at least one of

Columbia Historical Society



*The grounds of the unfinished Washington Monument saw duty both as a drill field and a beef depot for the Army.*



*Wartime Washington from an Army Signal Corps station in Georgetown*

Columbia Historical Society

Matthew Maury's policies, that of letting the professors of mathematics choose their own work. Moreover, because of war priorities, the quality of astronomical instruments had not kept up with the times. "The clocks, perfection in which is almost at the bottom of good work, were quite unfit for use. The astronomical clock with which . . . [we] . . . made our observations kept worse time than a high-class watch does to-day," recalled Newcomb years later. (8)

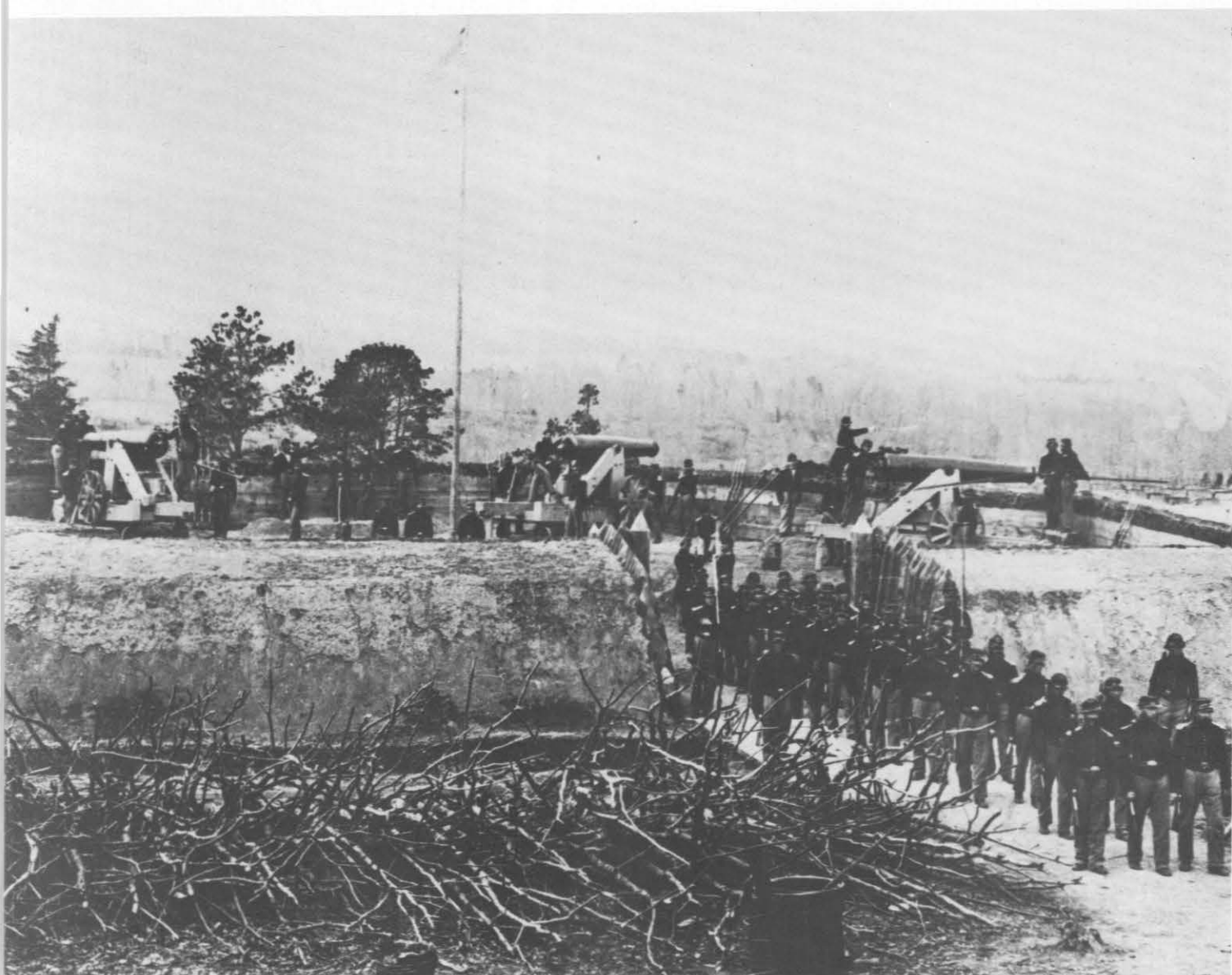
But even as Hall and Newcomb attacked the loose discipline, the latter admitted that the unregi-

mented atmosphere had something to recommend it. Before he came aboard he had a preconceived view of what life would be like as a Navy astronomer—a strict schedule and late-night observations. Instead, he delighted in the flexible arrangements. He would arrive at the Observatory on a clear evening, make observations, and return home when he desired. When he or his colleagues got tired "we would 'vote it cloudy' and go out for a plate of oysters at a neighborhood restaurant." (9)

But such diversions aside, New-

comb and the others put in their share of productive nights. "It was not considered safe to take an hour's sleep at the observatory. [The miasmatic fogs were suspected of making several employees ill.] The result was that, if it happened to clear off after a cloudy evening, I frequently arose from my bed at any hour of the night or morning and walked two miles to the observatory to make some observation." (10)

Asaph Hall's miseries that sticky summer of 1862 were not all job-related and they somewhat coincided with the bad times the Union armies



Columbia Historical Society

*Too close for comfort: The earthworks and some of the defenders of Fort Stevens on Washington's northern defense line. In the cleared fields just beyond the guns, Confederate skirmishers came as near as they ever would to the Nation's Capital.*

were suffering. The city was in an uproar. On the same field near Bull Run, the rebels again vanquished the bluecoats. This time Hall and his fellow employees could plainly hear cannon fire as the action came almost as close as Fairfax Court House, not 15 miles to the west. Ambulances again streamed across the Potomac bridges, filling already crowded hospitals to overflowing. Hall asked for time off to search them for wounded relatives or friends of the family. He brought several to the house in which

he and wife Angeline were residing and there they nursed them.

In September, not a month after the second Bull Run defeat, more wounded from the Antietam battlefield arrived. It was too much for Hall. The enervating heat, the all-night observations, and his part-time role as nurse took their toll. He came down with a case of jaundice, the effects of which lasted nearly 2 years.

The following spring smallpox broke out in the vicinity and, when 40

cases of the dread disease were reported at one time, Hall sent his wife and son back to New England.

Even under such conditions Hall did credible work making observations with the 9.6-inch refractor. When Professor of Mathematics F.G. Hesse resigned in the spring of 1863, Hall applied for the position and got a little unsolicited help from his strong, self-reliant wife, who wrote her husband's boss: "If the question is one of ability, I should be more than willing that he with all the other com-

petitors should have a thorough and impartial examination. I know I should be proud of the result. . . . I, more than any one, know of all his long, patient and faithful study." (11)

Not long afterward, CAPT Gilliss invited the applicant to his office to give him the good news. Smiling, he told Asaph that from then on Mrs. Hall might address him as Professor Hall. (12)

Occasionally, Hall's late-night observations were interrupted by visitors. One story, difficult to verify, is that which tells how one moonlit night President Lincoln showed up, and the astronomer, alone on duty, showed the Commander in Chief the moon through the 9.6-inch refractor. Several nights later, says one account written years later by Hall's son, his father "heard a knock at the trap door. He leisurely completed his observation, then went to lift the door, when up through the floor the tall President raised his head." (13) Lincoln had come unattended through the dark streets to inquire why the moon had appeared inverted in the telescope. Surveyor's telescopes he had once used showed objects in their true positions. Professor Hall explained the celestial telescope's optics, he and Lincoln chatted about astronomy for a while, and the President returned to the White House satisfied.

\* \* \*

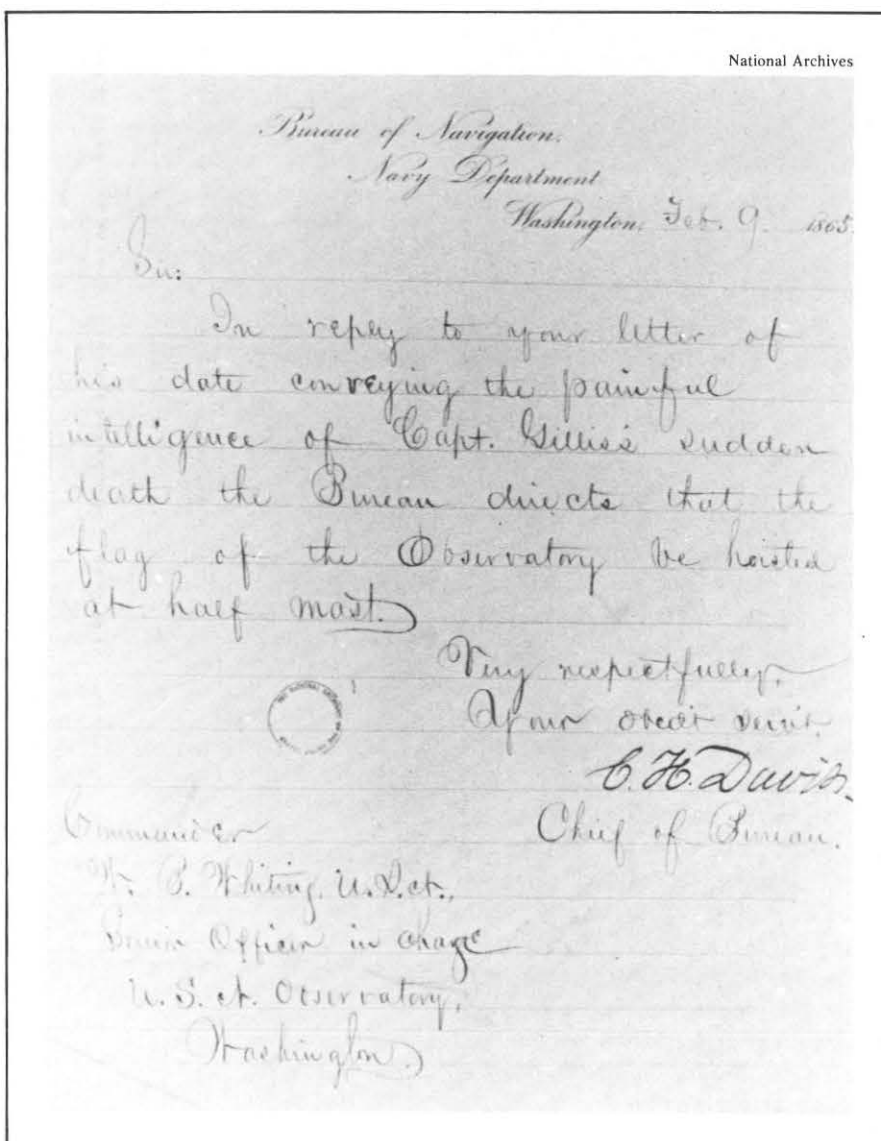
In July 1864 Washington had its biggest scare since the beginning of the war. Confederate General Jubal Early's troops had pushed aside a Union force near Frederick, MD, and were now at the northern approaches to the city. Only Fort Stevens, on the 7th Street Road (now Georgia Avenue) stood in their way. Able-bodied citizens, bureaucrats from government agencies, and invalid soldiers were scraped up and sent to the northern suburbs. All personnel of the War and Navy Departments were ordered out including the younger

professors of the Observatory. Simon Newcomb and Asaph Hall became members of a naval brigade, the rank and file being workmen from the Navy Yard. When Angeline and son came by the Observatory on 12 July, they found a note on Professor Hall's desk explaining his absence: "I am going out to Fort Lincoln; don't know how long I shall stay; am to be under Admiral Goldsborough. We all go. Keep Cool." (14)

Professor Newcomb found being a soldier an enlightening experience:

I was surprised to find how quickly one could acquire the stolidity of the soldier. During the march from the Navy Yard to the fort I felt extremely depressed, as one can well imagine, in view of the suddenness with which I had to take leave of my family and the uncertainty of the situation, as well as its extreme gravity. But this depression wore off the next day, and I do not think I ever had a sounder night's sleep in my life than when I lay down on the grass, with only a blanket between myself and the sky, with the expectation of being awakened by the rattle of musketry at daybreak." (15)

Hearing gunfire was the closest Hall and Newcomb ever got to com-



9 Feb 1865: CDR William B. Whiting, senior officer in charge of the Naval Observatory, receives permission to fly the flag at half staff in respect for his late commanding officer.



James M. Gilliss

bat. The real clash took place at Fort Stevens. The Confederates withdrew and the Observatory professors and their momentary comrades in arms were relieved by regular troops.

The war never came so close to Washington again. By the winter of 1864-65 the siege of Petersburg was grinding to its inevitable conclusion just south of Richmond where Lee's starving army was about to make its final retreat.

In Washington on 8 February *The Daily National Intelligencer* publicized Superintendent Gilliss' submission of a scientific report to the Secretary of the Navy. The report itself detailed a study of solar parallax Gilliss had begun years before while heading an expedition to Chile. (16) That evening he welcomed home his eldest son, recently freed from a rebel prison. By noon the next day CAPT James Gilliss was dead of a stroke at age 54.\*

\*The death certificate listed "serious apoplexy," but the attending Navy surgeon attributed the underlying cause to the Observatory's site, "a locality noted for its insalubrity." (17)

Two months later, on 7 April 1865, news reached Foggy Bottom of the fall of Richmond and the final pursuit of the Confederates. From the barracks on 23rd Street came round after round of cheers. "We thought it must be Petersburg or Richmond but hardly dared to hope which," recollected Newcomb. "I went down to the city. All the bedlams in creation broken loose could not have made such a scene. . . . I never felt prouder of my country than then. . . ." (18) Lee surrendered 2 days later.

The Naval Observatory and the Nation it served had survived the worst of times. James Gilliss had not. But during the 4 years he served as its Superintendent, his wise and vigorous leadership seemed to have turned things around. He took over a facility in which astronomy had seemed an afterthought and, even with the distractions of war, was able to inject both the science and the institution with new life. Years of unpublished observations were now in print, an experienced and capable staff was in place, and with peace at hand, the Observatory's golden age was about to begin. —JKH

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(To be continued in the June issue)

# Hemodynamic Effects of Naloxone in Hemorrhagic Shock

LT Edward J. Otten, MC, USNR-R  
William G. Barsan, M.D.

Hemorrhagic shock is a frequently encountered problem in emergency medicine. The response to hemorrhage may vary in different individuals, but once clinical shock is present, the pathophysiologic consequences are the same. Decreased blood pressure and cardiac output and increased systemic vascular resistance contribute to reduced tissue perfusion. The cellular response to decreased perfusion is hypoxia and acidosis which eventually result in cellular death and, if unabated, the death of the organism. (8)

The aim of emergency therapy of hemorrhagic shock is to increase tissue perfusion and rapidly diagnose and treat the underlying cause. The opiate antagonist naloxone has been shown to increase blood pressure in hemorrhagic shock. The method theorized for this blood pressure rise is the reversal of the effects of endogenous circulating endorphins. (2,4,5) Experimental injections of endorphine have been shown to decrease arterial blood pressure, and it is felt that naloxone can prevent or reverse this effect in the shock state. (6) The main question to be answered

is whether tissue perfusion is actually improved by this elevation in blood pressure.

To further clarify this issue a study was conducted to evaluate the effects of naloxone in hemorrhagic shock in dogs.

## Materials and Methods

Seven mongrel dogs of both sexes, weighing more than 20 kg, were used. Anesthesia was induced using pentobarbital 30 mg/kg and maintained with 1-2 mg/kg as necessary. The animal was intubated with a cuffed endotracheal tube and permitted to breathe room air without ventilatory assistance. Standard electrocardiograph limb lead II electrodes were applied and a Foley catheter was inserted into the urinary bladder. A triple lumen Swan-Ganz catheter with thermistor tip was inserted under fluoroscopy via the right femoral vein into the pulmonary artery. The left femoral vein was catheterized with a 16G catheter and used for the administration of intravenous fluids. Polyethylene catheters were placed via the right and left femoral arteries into the distal aorta to permit rapid removal of blood for induction of shock and for measurement of blood pressure respectively.

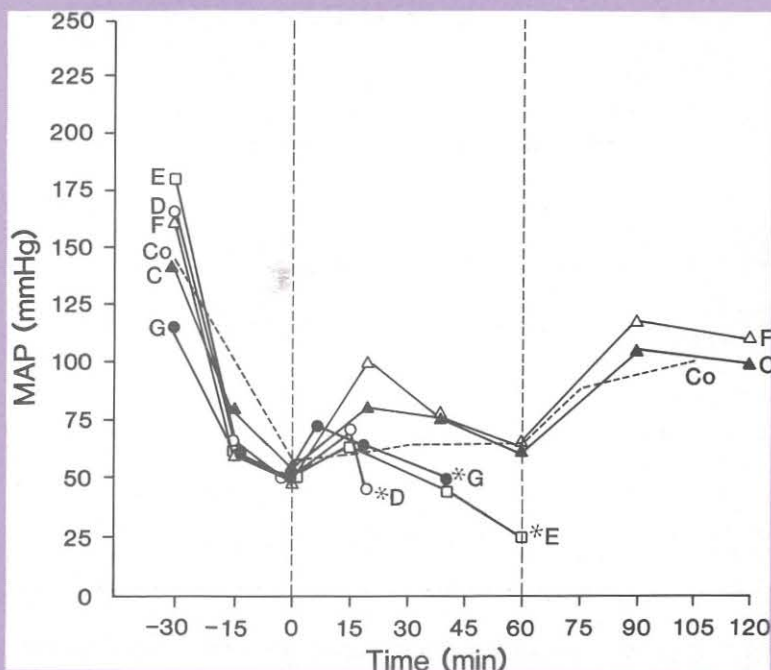
Cardiac output was measured using the thermodilution method with a cardiac output computer

(Model 9520, Edward's Laboratories, Division American Hospital Supply). A Gould-Stratham transducer was used to measure blood pressure. All parameters were recorded using an eight-channel physiograph (Grass Model 70 Polygraph, Grass Instrument Co.). All blood gases were determined immediately upon sampling and measured on an Acid Base Blood Micro System (BMS, M2, Radiometer). Temperature, pulse, blood pressure, mixed venous  $\text{PCO}_2$ , mixed venous pH, arterial  $\text{PO}_2$ , arterial  $\text{PCO}_2$ , arterial pH, cardiac output, electrocardiogram, urinary output, and systemic vascular resistance were measured on all animals at regular intervals. Systemic vascular resistance was calculated by dividing the mean arterial pressure by the cardiac output. Tissue perfusion was indirectly measured by calculating the capillary oxygen extraction. This was done by subtracting the mixed venous oxygen tension from the arterial oxygen tension.

The animals were allowed to stabilize 30 minutes after anesthesia and placement of catheters. Baseline measurements were then recorded and two animals randomly selected to act as controls. The animals were bled at a rate of 100 ml/min until a mean arterial pressure of  $55 \pm 5$  mmHg was reached (modified Wigger's technique). They were

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FIGURE 1. Mean Arterial Pressure vs. Time

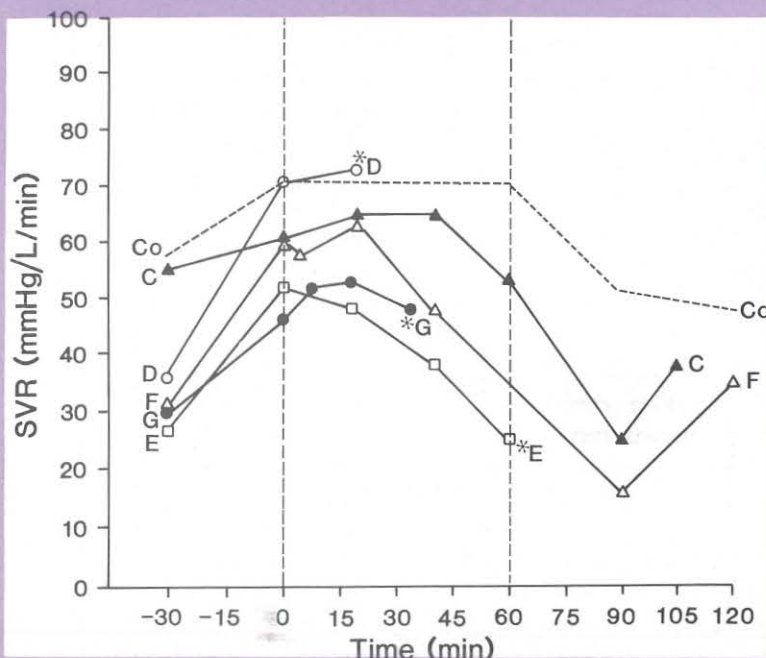


The shock phase starts at -30 minutes, the treatment phase at 0 minutes, and the fluid resuscitation phase at 60 minutes.

Co: Control group

\*Animal died

FIGURE 2. Systemic Vascular Resistance vs. Time



The shock phase starts at -30 minutes, the treatment phase at 0 minutes, and the fluid resuscitation phase at 60 minutes.

Co: Control group

\*Animal died

maintained at this level by either withdrawing more blood or administering Ringer's lactate solution. Measurements of cardiac output, mean arterial pressure, systemic vascular resistance, and oxygen and oxygen extraction were recorded during this shock period and at the end of the period. After 30 minutes of shock the five experimental animals were given a bolus of naloxone 1 mg/kg and the above measurements were taken at regular intervals for 60 minutes. No treatment was given to the control animals during this time period. At the end of 60 minutes all surviving animals were given Ringer's lactate solution 1½ times the amount of blood withdrawn minus any fluid given during the shock period. Hemodynamic measurements were again taken during this period. All animals were sacrificed at the end of the experiment.

Statistical analysis was done by using the difference between means and Student's t-test. Comparisons showing 2 "p" value less than .05 were considered significant.

## Results

**Shock Phase.** The amount of blood removed ranged from 61 percent to 89 percent of the blood volume with an average of 70 percent. There was no correlation between the amount of blood removed and survival.

During the 30-minute period of shock all animals showed a decrease in mean arterial pressure and cardiac output, an increase in systemic vascular resistance and pulse, and a decrease in urinary output and tissue perfusion. There were no changes in temperature or in the electrocardiogram. All animals became more acidotic during this period. All animals survived the shock phase.

**Treatment Phase.** All five animals given the bolus of naloxone 1 mg/kg showed an increase in mean arterial pressure that was significant ( $p < .05$ ). The rise in blood pressure ranged

from 15 mmHg to 40 mmHg with an average of 22 mmHg (Figure 1). This increase in blood pressure lasted for the entire 60 minutes for two of the animals. However, in three of the naloxone-treated animals, the blood pressure began to decrease over 20 minutes and in less than 40 minutes they were dead. The two surviving animals had the largest initial increase in blood pressure over baseline. The two control animals maintained the same mean arterial pressure throughout this period.

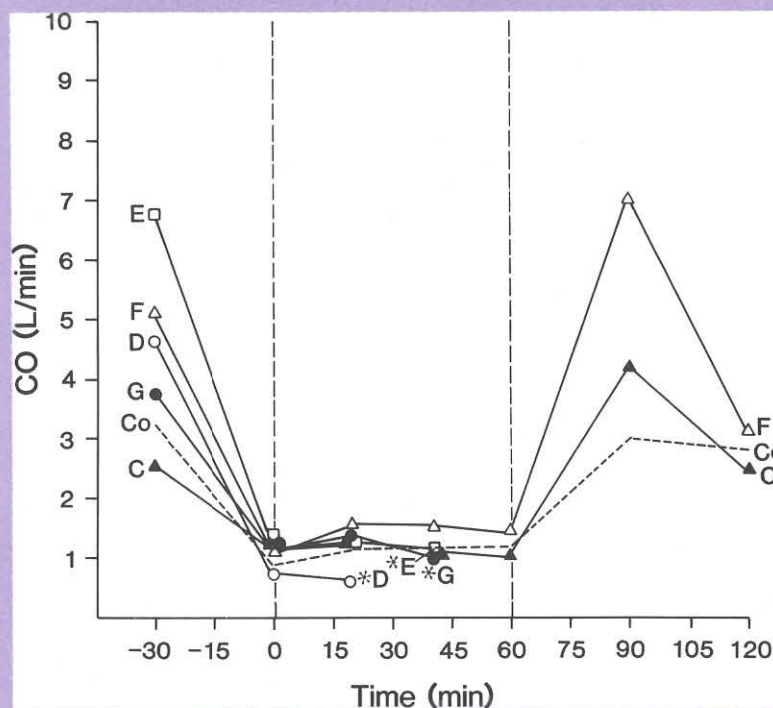
The systemic vascular resistance increased in four of the five naloxone-treated animals. The two surviving animals had the largest increase in SVR over baseline. This rise in SVR gradually decreased during this period for the two survivors. The control dogs had no change in SVR during this period (Figure 2).

Four of the treated dogs showed an increase in cardiac output during the first 20 minutes of the period, but this was not significant. The two control dogs also showed a slight increase in cardiac output during the initial 20 minutes of this period (Figure 3).

Three of the treated animals and both controls showed an increase in capillary oxygen extraction during this period. This indicated a decrease in tissue perfusion (Figure 4). The two animals not showing a decrease in tissue perfusion died during this period. All animals, treated and control, showed a decrease in pH and less than 5 ml of urine output. The three dogs that died showed pronounced bradycardia on electrocardiogram just prior to cardiorespiratory arrest.

**Fluid Resuscitation Phase.** Both the naloxone-treated dogs and the control dogs showed an increase in MAF with an infusion of Ringer's lactate solution. All animals showed a decrease in SVR and an increase in cardiac output initially. After 30 minutes in this phase the SVR began to rise and the cardiac output to fall. The urine output increased and the

FIGURE 3. Cardiac Output vs. Time

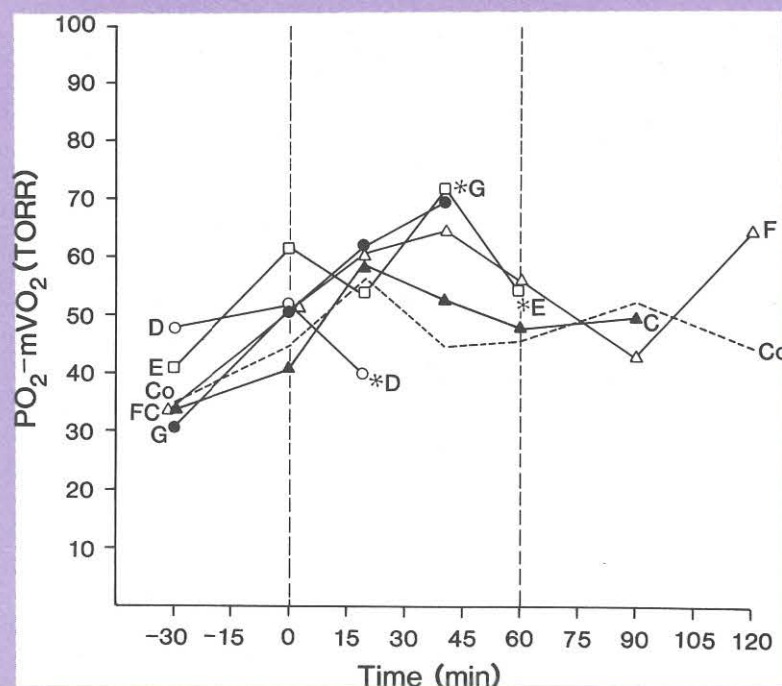


The shock phase starts at -30 minutes, the treatment phase at 0 minutes, and the fluid resuscitation phase at 60 minutes.

Co: Control group

\*Animal died

FIGURE 4.  $PO_2 - mVO_2$  vs. Time



The shock phase starts at -30 minutes, the treatment phase at 0 minutes, and the fluid resuscitation phase at 60 minutes.

Co: Control group

\*Animal died

acidosis improved. Tissue perfusion increased initially, but decreased after 30 minutes in one of the naloxone animals. There were no electrocardiogram changes during this period.

## Discussion

Our results indicate that naloxone will increase the mean arterial pressure when given to dogs in hemorrhagic shock and that this increase is significant when compared to control. We did not have a significant increase in cardiac output or in tissue perfusion. We did have an increase in systemic vascular resistance which we feel is responsible for the increase in mean arterial pressure. There was a 40 percent survival rate in treated animals compared with 100 percent for the controls.

Previous studies by Faden and Holaday,<sup>(1,2,4,5)</sup> Vargish et al.<sup>(9)</sup> and Reynolds et al.<sup>(7)</sup> demonstrated an increase in mean arterial pressure, cardiac output, and survival. However, they reported no significant increase in systemic vascular resistance. Their studies did not measure parameters of tissue perfusion.

The difference in the previous studies and our study may be due to the dose of naloxone used. We used a 1 mg/kg bolus of naloxone. Vargish et al. used a 2 mg/kg bolus and an infusion of 2 mg/kg/hr in their study of hemorrhagic shock in dogs. They had a survival rate of 100 percent with a control survival of 0 percent. Reynolds et al. used a 2 mg/kg bolus in one group of dogs and a 1 mg/kg bolus in another group of dogs in endotoxic shock. They had an 89 percent survival rate in the first group and a 0 percent survival rate in the second. The control group had a 21 percent survival rate.

Faden and Holaday used a 1 mg/kg dose in their study of hemorrhagic

shock in rats and a 10 mg/kg dose in their endotoxic and spinal shock studies in rats. Faden and Holaday<sup>(1)</sup> did find a correlation between the dose of naloxone and the MAP response in endotoxic shock in rats. To three groups of rats they gave 0.1 mg/kg, 1 mg/kg, and 10 mg/kg of naloxone. They found that the group that received 1 mg/kg had the highest increase in mean arterial pressure. There was no difference in survival rate. From these studies it seems that there is an inconsistency in the response to similar doses of naloxone.

There is evidence, then, that endorphins are released during shock and that naloxone can block the effect of the endorphins. The mechanism by which the endorphin causes cardiodepression is unknown. Vargish et al. postulated that endorphin causes the release of myocardial depressant factor (MDF), although they admitted that there does not seem to be a temporal relationship between them.<sup>(9)</sup> Faden and Holaday have postulated an interneuronal inhibitory system involving several neurotransmitters.<sup>(1,4)</sup>

Once it becomes possible to identify MDF with some certainty<sup>(3)</sup> and the endorphin(s) responsible for the cardiodepressant effect is known, more definitive studies can be done. Because of the various doses of naloxone used in the studies mentioned and the inconsistent results obtained, we feel that naloxone levels should be measured in any future experiments. Then the level of naloxone that can increase blood pressure, cardiac output, and tissue perfusion, and improve survival will be known. We also feel that in future studies the systemic vascular resistance and oxygen extraction should be closely monitored in order to measure the real benefit of any modality used in the therapy of shock.

## Conclusion

We found that naloxone increased the mean arterial pressure of dogs in hemorrhagic shock by increasing the systemic vascular resistance. Naloxone did not increase tissue perfusion nor did it improve survival at the dose we used. We feel that before naloxone can be thought of as a useful entity in the treatment of shock, a great deal of basic research into the role of endorphins in human physiology must be done.

## Acknowledgment

The authors are grateful to Endo Laboratories Inc. (Garden City, New York) for their donation of naloxone and to Majorie Gabel for her time and advice.

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# Technique for Plantar Wart Destruction

LCDR Ronald A. Warcholak, MSC, USN

For over 20 years sclerosing agents have been used by podiatrists for the treatment of plantar warts and have proved to be especially effective in cases that have resisted other forms of therapy. The technique is highly recommended for practitioners, especially those aboard ship, who must treat plantar warts with a minimum of available instruments and medicants. It causes minimal patient discomfort and is ideal for those patients who must remain ambulatory throughout the course of treatment.

Briefly, plantar warts have the following characteristics:

- Warts found on the sole of the foot tend to be flat due to pressure. They are, however, similar in every other respect to warts found elsewhere on the body.
- Plantar warts tend to be round and conical in shape. When the superficial skin covering is removed from a plantar wart it appears to be larger in circumference than when viewed on the most superficial surface of the skin.

- The normal papillary lines found on the sole of the foot do not pass through the area of the plantar verruca.

- Plantar warts contain capillary tufts. The ends of these tufts often appear dark in color. Lay people erroneously call these dark tufts seeds. When the superficial skin covering is removed from a plantar verruca, the capillary tufts are usually cut. This gives rise to pinpoint bleeders in the diameter of the wart. This is an excellent diagnostic characteristic to look for in diagnosing plantar warts.

- Because of their vascularity, warts on the plantar aspect of the foot tend to be more painful when squeezed rather than when direct digital pressure is applied.

## Treatment

1. The wart to be treated is shaved of its superficial skin covering to help delineate its true circumference. A #15 blade is commonly used.

2. 1-2 cc of a local anesthetic is infiltrated about the wart. The anesthetic usually used is 2 percent plain lidocaine. A 3 cc syringe with a 26 gauge ½-inch needle is ideal for use in anesthetizing plantar warts.

3. A tuberculin syringe is filled with several minims of 1 percent Sotradecol.\* To properly inject the verruca, the syringe is held at a 45° angle to the skin surface. The needle penetrates the wart at its observed circumferential margin. The needle is advanced several mm into the center of the wart. Normally, 1-2 minims of the sclerosing agent are now deposited intralesionally. Care is taken at all times not to deposit any of the sclerosing agent into healthy non-warty tissue as an area of necrosis will form.

4. No analgesics are prescribed after the procedure as there is very little discomfort. The patient is told that the wart will turn black in several days. Additionally, the patient is instructed to return in 7 days to have the sclerosed devitalized wart removed. This debridement is surgically accomplished with a #15 scalpel blade and tissue forceps without local anesthesia. A topical antiseptic or antibiotic cream is prescribed for application to the area until completely healed. □

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\*Sotradecol 1 percent is the brand name for sodium tetradecyl sulfate 1 percent and is manufactured by Elkins-Sinn, Inc., Cherry Hill, NJ 08002.

# Navy Graduate Medical Education for 1983

## Residency and Fellowship

It is again time to consider applications for graduate medical education (GME).

Nominations for selection to GME will take place at the 14th Annual Surgeon General's Specialties Advisory Committee (SAC XIV) Conference to be held 12-17 Sept 1982 in Washington, DC. Navy GME program directors will meet to review and evaluate applications for training beginning in 1983. The deadline for receipt of applications is 15 Aug 1982.

Those who plan to apply should begin immediately gathering the necessary recommendations and data. The procedure for making application is described in BUMED-INST 1520.10H. Strong emphasis is placed upon beginning early so that proper endorsements can be obtained and the application received before 15 Aug 1982.

Table 1 describes the programs available for 1983 training. There may be slight variations in the number of positions by the time official notice is distributed and the SAC conference convenes.

In addition to the Navy inservice training, there are deferment programs for Reserve officers and full-time outservice programs in civilian institutions under Navy sponsorship for career motivated medical officers.

### Deferment Programs

Reserve medical officers who desire training in a civilian institution, without incurring an additional obligation and without Navy subsidy,

may apply for deferment as a choice of training site. If selected for deferment, you will be transferred to an inactive Reserve status and participate in the civilian program at your own expense. After completion of the program, you will return to active duty to complete any previous active duty obligation or 2 years whichever is greater.

It is the usual policy to defer primarily those applicants who have applied for the critical specialties in general surgery, orthopedics, anesthesia, and preventive and occupational medicine. These critical areas may change before 1 Sept 1982. Applications are not deferred to civilian programs when there are vacancies in Navy programs in the same specialty. Applicants are responsible for seeking their own civilian program.

### Full-Time Outservice Training

Full-time outservice (FTOS) training is also available to applicants who desire training in the critical specialties. Applicants are rarely placed in FTOS positions when Navy program vacancies exist. In this program, those accepted remain on active duty and receive full Navy pay and allowances while training in a civilian institution. In all cases, the individual applicant is responsible for finding the approved program. The active duty obligation for this program is on a year for year basis and is added to any previous obligation, i.e., if you have a 2-year obligation remaining from the scholarship program and

you take a 4-year FTOS training program, your total obligation after completion would be 6 years. Although the obligation may seem rather lengthy, you should look at the salary differential between Navy subsidized residency and civilian residency training positions and career potential after training.

If you are interested in this program, you do not necessarily have to have a civilian acceptance at the time of application. You may apply using FTOS as a location choice and indicate that the "site is to be determined." You should not enter into any type of commitment with a civilian institution before you receive written notification of selection.

It is not always possible for those individuals in the operational assignments to be relieved from their duty station in time to report to a civilian institution for training exactly on 1 July. Although every effort is made to see that you begin training by 1 July, the arrival date could be from July to September before you can enter the program since a relief may be required before you are allowed to transfer. Civilian program directors should be made aware of this point.

Another important factor in FTOS training is to be aware of the law regarding stipends. You may not accept any salary, gift, stipend, or payment of any kind from that civilian institution during your training.

While training in a civilian institution, under orders from the Navy, you are covered from the malpractice

standpoint by the Federal Torts Claims Act or the Gonzales Bill.

All applicants who are accepted for FTOS training will be *required to augment to the regular Navy*. Those who are already regular Navy will be given priority for consideration since this program is primarily designed for career officers in the critical specialty areas.

#### Chances for Selection

It should be well understood that over the past 5 years, interns have rarely continued directly into any specialty training except in flight surgery or undersea medicine.

Regular Navy medical officers who are serving in the fleet or operational assignments, are given first priority for consideration. You should also understand that some specialties are more competitive than others and the selection percentage may be lower for small popular programs with many applicants. Table 2 reveals the overall statistics for SAC XIII selections in September 1981 to enter training in July 1982.

The final nominations for selection to Navy graduate medical education programs are reviewed and approved by the Surgeon General. Until this process is complete, the results of the SAC conference are unequivocally confidential. Any information divulged before that time is not only in violation of the precept taken prior to the SAC board deliberations, but is totally unofficial and should be ignored.

**TABLE 1. Navy Residencies/Fellowships**

|                             | Years of Training<br>Offered | Number of Positions<br>Each Year | Bethesda | Brommeton | Camp Pendleton | Charleston | Jacksonville | Oakland | Pensacola | Portsmouth, VA | San Diego |
|-----------------------------|------------------------------|----------------------------------|----------|-----------|----------------|------------|--------------|---------|-----------|----------------|-----------|
| Aerospace Medicine (1)*     | 3                            | 3                                |          |           |                |            | 3            |         |           |                |           |
| Anesthesiology *            | 2/3                          | 20                               | 6        |           |                | 4          |              | 4       | 6         |                |           |
| Dermatology *               | 3                            | 6                                | 2        |           |                |            |              |         |           | 4              |           |
| Family Practice *           | 2/3                          | 41                               |          | 4         | 9              | 9          | 10           | 9       |           |                |           |
| Hand Surgery                | 1                            | 2                                |          |           |                | 2          |              |         |           |                |           |
| Internal Medicine *         | 3                            | 27                               | 5        |           |                | 4          |              | 7       | 11        |                |           |
| Cardiology                  | 2                            | 6                                | 2        |           |                |            |              |         | 4         |                |           |
| Endocrinology               | 2                            | 3                                | 2        |           |                | 1          |              |         |           |                |           |
| Gastroenterology            | 2                            | 4                                | 2        |           |                |            |              |         | 2         |                |           |
| Hematology/Oncology         | 3                            | 4                                | 2        |           |                |            |              |         | 2         |                |           |
| Infectious Disease          | 2                            | 4                                | 2        |           |                |            |              |         | 2         |                |           |
| Nephrology                  | 2                            | 2                                |          |           |                |            |              |         | 1         | 1              |           |
| Pulmonary Disease           | 2                            | 4                                | 1        |           |                |            |              |         | 1         | 2              |           |
| Rheumatology                | 2                            | 1                                |          |           |                |            |              |         |           | 1              |           |
| Neurology                   | 3                            | 2                                | 2        |           |                |            |              |         |           |                |           |
| Neurosurgery *              | 5                            | 1                                | 1        |           |                |            |              |         |           |                |           |
| Nuclear Medicine            | 2                            | 3                                | 2        |           |                | 1          |              |         |           |                |           |
| Obstetrics & Gynecology*    | 3                            | 18                               | 3        |           |                | 3          |              | 6       | 6         |                |           |
| Gynecologic Oncology (4)    | 2                            | 2                                | 1        |           |                |            |              |         | 1         |                |           |
| Maternal Fetal (4)          | 2                            | 1                                | 1        |           |                |            |              |         |           |                |           |
| Ophthalmology *             | 3                            | 9                                | 4        |           |                | 2          |              |         | 3         |                |           |
| Orthopedic Surgery *        | 4                            | 13                               | 2        |           |                | 3          |              | 3       | 5         |                |           |
| Otolaryngology *            | 4                            | 10                               | 2        |           |                | 3          |              | 2       | 3         |                |           |
| Pathology *                 | 4                            | 8                                | 2        |           |                | 2          |              | 2       | 2         |                |           |
| Hematopathology             | 1                            | 1                                | 1        |           |                |            |              |         |           |                |           |
| Pediatrics *                | 2/3                          | 16                               | 3        |           |                | 3          |              | 5       | 5         |                |           |
| Adolescent Medicine         | 2                            | 1                                |          |           |                |            |              |         | 1         |                |           |
| Pediatric Hematology        | 2                            | 1                                |          |           |                |            |              |         | 1         |                |           |
| Plastic Surgery             | 2½                           | 1                                |          |           |                |            |              | 1       |           |                |           |
| Psychiatry *                | 3                            | 9                                | 3        |           |                |            |              | 3       | 3         |                |           |
| Radiology (Diagnostic) *(5) | 3/4                          | 17                               | 5        |           |                | 4          |              |         | 8         |                |           |
| Radiology (Therapeutic)*    | 3                            | 1                                |          |           |                |            |              |         | 1         |                |           |
| Radiology fellowships (2)   | 1                            | 2                                |          |           |                |            |              |         | 2         |                |           |
| Surgery, general *(3)       | 4/5                          | 14                               | 3        |           |                | 3          |              | 4       | 4         |                |           |
| Peripheral Vascular         | 1                            | 1                                |          |           |                |            |              |         | 1         |                |           |
| Thoracic & CV Surgery       | 2                            | 2                                | 1        |           |                |            |              |         | 1         |                |           |
| Urology *                   | 4                            | 6                                | 1        |           |                | 1          |              | 2       | 2         |                |           |

\*Indicates number of years training beyond GME year one.

- (1) One year outservice for Masters Degree and 2 years inservice—positions shown reflect inservice positions only.
- (2) Neuroradiology, angiography, pediatric radiology, ultrasound/computed tomography, and nuclear radiology—only two fellowships will be filled each year.
- (3) If the GME-1 year was not completed in an accredited surgery program consisting of 6 months of surgical rotations, the length of time required will be 5 years after GME-1.
- (4) One position every other year.
- (5) May be increased to 4 years.

### Notification

Every effort will be made to notify SAC XIV applicants of the action taken upon their application by 15 Oct 1982. Those accepted will receive a Medical Officer Service Training Agreement explaining their obligation for the training to which they were accepted. It should be signed and returned within 10 days. Failure to do so indicates disinterest in the training and intent to decline and could result in the loss of the training position which would then be offered to the alternate.

Alternates are accepted for each specialty; however, since orders and assignments are made by the Naval Military Personnel Command by January, the SAC alternate list only exists until 1 Jan.

BUMEDNOTE 1520, officially announcing GME opportunities for 1983 will be published and distributed in the near future.

For information on residencies/fellowships contact: CAPT James F. Lyons, MC, USN, Naval Health Sciences Education and Training Command (Code 31), National Naval Medical Center, Bethesda, MD 20814. Telephone: Autovon 295-0648, Commercial (301) 295-0648. □

TABLE 2. SAC XIII Statistics

| Specialty               | Positions Offered | Number of Applications |
|-------------------------|-------------------|------------------------|
| Aerospace Medicine*     | 3                 | 3                      |
| Anesthesiology          | 20                | 33                     |
| Dermatology*            | 6                 | 32                     |
| Family Practice         | 41                | 76                     |
| Internal Medicine*      | 26                | 78                     |
| Neurology*              | 2                 | 5                      |
| Neurosurgery            | 1                 | 8                      |
| Nuclear Medicine*       | 3                 | 4                      |
| Obstetrics/Gynecology   | 34                | 17                     |
| Ophthalmology*          | 9                 | 30                     |
| Orthopedic Surgery*     | 13                | 72                     |
| Otolaryngology          | 10                | 24                     |
| Pathology*              | 8                 | 13                     |
| Pediatrics              | 16                | 29                     |
| Psychiatry              | 12                | 20                     |
| Radiology, Therapeutic* | 1                 | 3                      |
| Radiology, Diagnostic   | 17                | 19                     |
| Surgery*                | 14                | 47                     |
| Urology                 | 6                 | 13                     |
| Total = 252*            |                   |                        |

Of 252 positions offered, 216 were filled at SAC XIII, leaving 46 vacancies. Fleet applicants filled 81 percent of the 216 positions, incumbent interns filled 15 percent and reservists and civilians filled 4 percent.

\*Specialties which filled 100 percent of positions with fleet applicants.

## Selective Service Registration

The following information is provided to insure that certain first term enlistees and members in the Reserve components and the delayed enlistment program (DEP) (active and Reserve) understand their registration responsibilities.

By Presidential Order, individuals who should have registered, but did not, could have registered without penalty through 28 Feb 1982. Individuals may register at any U.S. Post Office, U.S. Em-

bassy or Consulate, or designated registrar on many European bases.

The following are exempt from registration:

- Persons on active duty so long as they remain on active duty.
- Members of Reserve components on extended active duty.

All those not on active duty and born on or after 1 Jan 1960 and who have reached age 18 are required to register. This includes

all those in Reserve components and those in the delayed entry program.

Active duty members in this age group separating from active service must register within 30 days of their separation date if not previously registered.

All students in the Armed Forces Health Professions Scholarship Program are reminded that they are not exempt from this registration requirement.

# Armed Forces Health Professions Scholarship Students

## Internships

The time is approaching for the class of 1983 to start thinking of internships (GME-1). Application forms will be distributed on or about 1 May 1982. The deadline for submission of applications is 1 Sept 1982.

There will be a total of 293 internships offered at nine medical centers. Prospective candidates are urged to visit the medical centers of their choice for interviews. It is realized that time and money will be a problem for some; however, candidates should try to visit at least one medical center that offers the training of their choice.

## Deferments

Under the Navy's Active Duty Delay Program for Specialists (NADDPS), the Navy can grant deferments of active duty obligations in order for medical officers to complete specialty training programs at civilian institutions. Obligated officers who are applying for Navy programs can request an alternate preference to stay in the civilian sector for training or be released from active duty for that purpose. The consideration given to those requests will be determined by a board of officers based upon the Navy's needs at the time as compared to the needs of the future for specialists.

## Taxes

Students who entered the Armed Forces Health Professions Scholarship Program on or after 1 Jan 1981 will have to pay income taxes on their stipend. The stipend of students who were enrolled on 31 Dec 1980 will be exempt through calendar year 1984.

## Pay

Students who entered the Armed Forces Health Professions Scholarship Program on or before 14 Sept 1981 will continue to receive 4 years of credit for pay purposes when they are reappointed in the Medical Corps subsequent to graduation. Students who entered the program on or after 15 Sept 1981, the effective date of the Defense Officer Personnel Management Act (DOPMA), Public Law 96-513, will not receive credit for pay purposes for time spent in medical school. However, all students will continue to receive 4 years of credit in establishing entry grade upon graduation.

The Judge Advocate General has recently opined that medical and dental officers who have relinquished their commissions and are reappointed on or after 15 Sept 1981, do not receive the 4 years of credit for pay purposes for having attended medical or dental school nor do they receive the 1 year of credit for having completed a civilian internship, un-

less they held a Reserve commission in the Medical Corps or Dental Corps during the period of their internship. Therefore, medical and dental officers who are leaving the Navy, short of retirement, are encouraged to retain their Reserve commissions. Regulars who resign are urged to accept a Reserve commission prior to their detachment from active duty. Such officers who may subsequently request and be approved for recall to active duty will have their credit for pay purposes protected.

While in the Naval Reserve, and not on active duty, all Reserve officers are urged to participate in Reserve affairs. Under DOPMA, Reserve officers will be eligible for consideration for promotion with their contemporaries who are on, or have remained on active duty. Participation in Reserve affairs can be enjoyable, financially beneficial, and provide retirement security as well as enhance a candidate's chances of selection for promotion. Information concerning opportunities for Reserve participation in a given area can be obtained from local Naval Reserve Centers and from Naval Reserve Readiness Commands.

For information concerning internships (GME-1) contact: CDR C.B. Mohler, MSC, USN (Ret.), Bureau of Medicine and Surgery (MED 214), Washington, DC 20372. Telephone (202) 254-4166. □

## Correction

The item, entitled Navy Aids Island Hospital published in *U.S. Navy Medicine*, January 1982, page 7, identified CAPT Richard S. Fitzgerald as the COMNAVAIRLANT Reserve liaison officer (center). CAPT Miles Masters is the officer shown in photo.

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